The Magazine for Amateur Radio and Computerists

CTM

March, 1987
$2.50 (U.S.)
$3.00 Canada
(In our 5th Year)

The California Earthquake

Is the Amateur Radio Community *Ready* to handle the Emergency Communication responsibility as required by the FCC?

The Portable Pakratt™

Converting the Commodore C-64 to 12 vdc operation. . . (Part 3)

Daddy Does Dayton

A look at the HamVention® thru the eyes of one who goes from year-to-year. . .

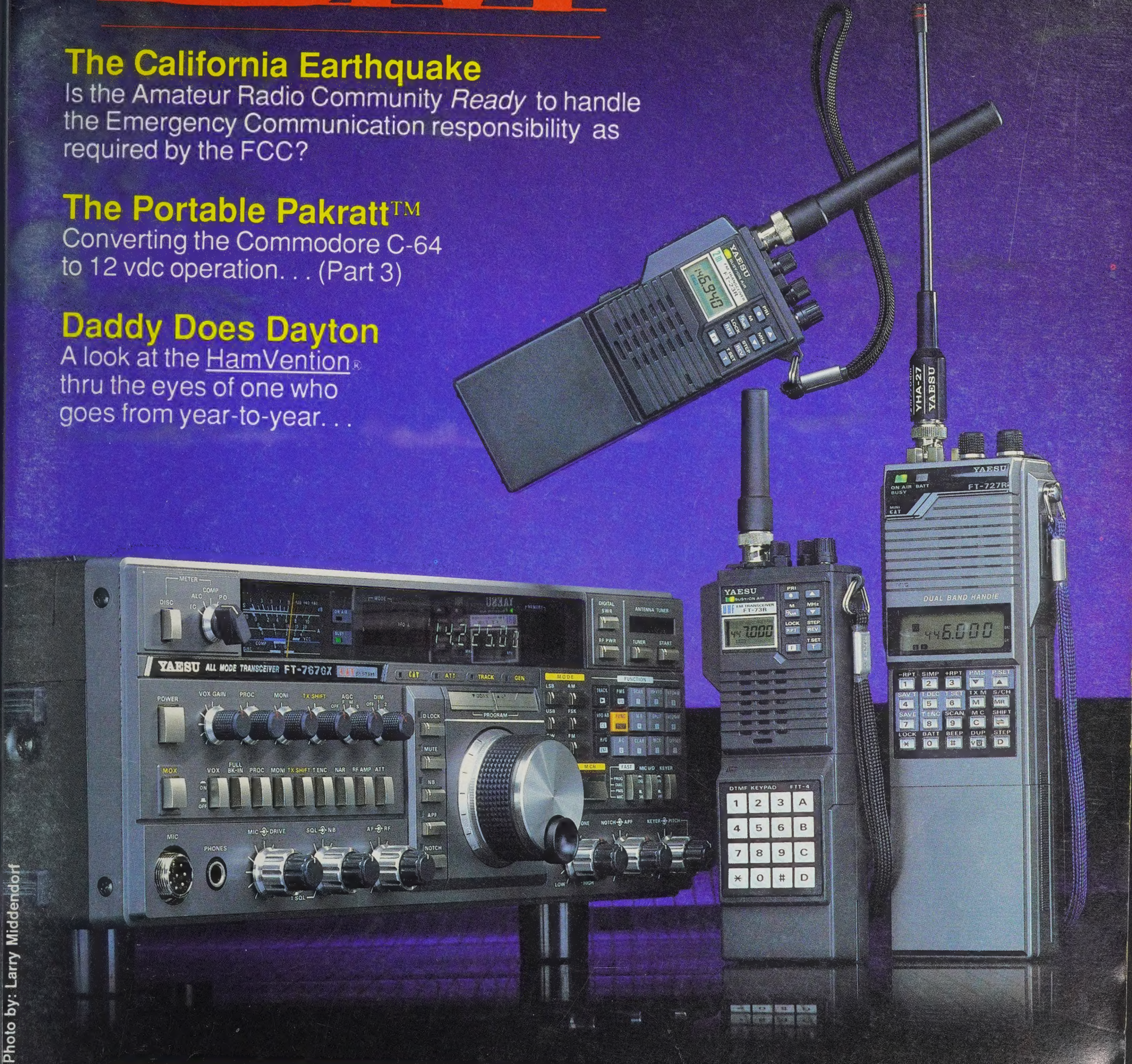

Photo by: Larry Middendorf

Taking a close look at Yaesu's FT-767GX, FT-23R, FT-73R and FT-727R

Finally, an HT that's built to take the realities of life.

Let's face it. It's easy to bump, drop, or get rain on an HT. ■ But if your HT is Yaesu's mini 2-meter FT-23R or 440-MHz FT-73R, such mishaps are a lot less worrisome. ■ They're built to last, with rugged aluminum-alloy cases that prove themselves reliable in a one-meter drop test onto solid concrete. Plus, their moisture-resistant seals really help keep the rain out.

Built for the realities of operating. Despite their miniature size, both radios have all the operating capabilities of larger microprocessor-controlled HTs. Yet operating them couldn't be easier. Consider: ■ You get a 7.2-volt, 2-watt battery pack. (Optionally, a 12-volt, 5-watt pack, or 7.2-volt miniature 2-watt pack.) 10 memories that store frequency, offset and PL tone. (7 memories can store odd splits.) Memory scan at 2 frequencies per second. Band scan at 10 frequencies per second. Tx offset storage. Priority channel scan. Tuning via tuning knob, or up/down buttons. PL tone board (optional). PL display. External PL selection. Independent PL memory per channel. PL encode *and* decode. Expanded Rx coverage.* LCD power output and "S"-meter display. Battery saver circuit. Push-button squelch override. Eight-key control pad. Keypad lock. High/low power switch (½ watt on low power.) ■ Options available: Dry cell battery case for 6 AAA-size cells. Dry cell battery case for 6 AA-size cells. DC car adapter/charger. Programmable CTCSS (PL tone) encoder/decoder. DTMF keypad encoder. Mobile hanger bracket. External speaker/microphone. And much more. ■ So get the intelligent mini HT that's built for life's realities. Yaesu's 2-meter FT-23R, or 440-MHz FT-73R.

Radios above shown actual size.

YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847.
Yaesu Cincinnati Service Center 9070 Gold Park Drive, Hamilton, OH 45011. (513) 874-3100.

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Introducing all-mode radios for your mode of travel.

Yaesu's 2-meter FT-290R and 6-meter FT-690R Mark II Series are the perfect all-mode traveling companions.

On the road, simply snap on the heat sink, apply 12 volts of power, and you've got a 25-watt mobile station. (FT-690R: 10 watts).

On foot, attach the optional C-cell battery pack and shoulder strap, and take off with 2.5 watts RF output.

You get around fast on SSB, CW and FM with ten memories, dual VFOs, LCD display, automatic storage of repeater shift into memory register, offset tuning during receive or transmit for satellite operation, relative power output/S-meter, and optional CTCSS unit.

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The FT-290R and FT-690R Mark II are perfect for emergency use, camping trips, talking around town, and DX work.

Plus each is priced to maximize your ham budget's mileage.

So discover Yaesu's 2-meter FT-290R Mark II and 6-meter FT-690R Mark II all-mode transceivers today. They're just a quick trip away at your nearest Yaesu dealer.

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DAYTON Hamvention®

April 24, 25, 26, 1987

Early Reservation Information

- General Chairman, Jim Simpson, WB8QZZ
- Asst. General Chairman, Bill McNabb, WD8SAY

Grand banquet tickets are limited, please place your reservations early.

- **Giant 3 day flea market • Exhibits**
- **Door prizes • License exams**
- **CW proficiency test**

Flea Market Tickets

We increased Flea Market area by nearly 400 spaces this year and all were sold out by January 10.

Special Awards

Nominations are requested for "Radio Amateur of the Year", "Special Achievement" and "Technical Achievement" awards. Contact; Awards chairman, Box 44, Dayton, OH 45401.

License Exam

Novice thru extra exams scheduled Saturday & Sunday by appointment only. Send current FCC form 610, copy of present license and check for $4.35 (payable to ARRL/VEC) to: Exam Registration, 8830 Windbluff Point, Dayton Oh 45459

Slide Show

35 mm slide/tape presentation about the HAMVENTION is available for loan. Contact Dick Miller 2853 La Cresta, Beavercreek, OH 45324

Parking

Free parking is available at Hara Arena. In addition, there will be free shuttle bus service from all major motels and designated parking lots. Parking and road information will be available on DARA's 146.34/.94 repeater.

Free Bus Service

Free Bus Service will be provided between many Motels and Hara Arena. See the schedules at the motel registration desks. Avoid parking problems at the Arena by taking the HAMVENTION buses.

Campers & Trailers

Campers and Trailers may be parked at Montgomery County Joint Vocational School. A HAMVENTION bus will provide transportation between the camper parking area and the Arena. No campers or travel trailers will be permitted to park in the Arena lot or Flea Market area.

Wheelchairs

Wheelchairs will be available. Send S.A.S.E. for details to "Wheelchair" P.O. Box 44, Dayton, OH 45401.

Alternate Activities

HAMVENTION is for everyone. We have planned activities for the YL or your non-ham family members.

Deadlines

Award Nominations: April 4
Lodging: April 4
License Exams: March 28
Advance Registration and banquet: USA - April 11
Canada - April 4

Information

General Information: (513) 433-7720
or DARA Box 44 Dayton, OH 45401
Flea Market Information: (513) 223-0923
Lodging Information: (513) 223-2612
(No Reservations By Phone)

This is the year for you to attend the internationally famous Dayton HAMVENTION. Come with your friends to hear enlightening forums, see the latest equipment, and visit a flea market that has everything! No matter what you are looking for, you can find it in Dayton!

HAMVENTION is sponsored by the
Dayton Amateur Radio Association Inc.

NOVICES
Congratulations!

You have worked very hard in getting your NOVICE TICKET. The road ahead must seem to be almost unobtainable, but it isn't, with the proper information. That is where CTM Magazine can help. CTM is the only magazine dedicated in bringing you information on how your home computer can give you many hours of enjoyment when used with your ham equipment. We are also the Number One Source of PACKET Information.

To assist you in learning more about your newly found hobby, just send this page along with a copy of your novice ticket and we will send you a FREE copy of CTM. In fact, send us a copy of your upgraded ticket and we will send you another FREE copy or add an EXTRA MONTH to your subscription.

To take advantage of this offer, YOU MUST SEND A COPY OF YOUR TICKET WITHIN 1 MONTH OF THE DATE ON THE TICKET. Due to large number of new licenses being issued each month, we MUST place a limitation on this offer. This offer may be suspended without notice at any time.

OR, if you send a copy of your NEW license along with your subscription, we will add an extra copy to your subscription. And, if you don't like what you get, cancel anytime and get your money back on all undelivered issues.

You only loose if you don't take advantage of this OFFER!

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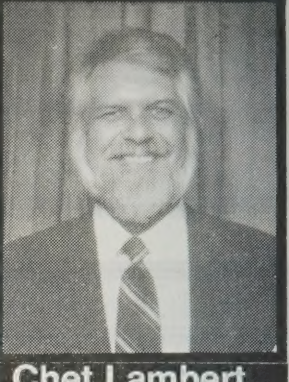
Daddy Does Dayton photos by Alan Smith, W8CHK
All other photos by respective writers.

(An Editorial and just plain talk)

Chet's Chats



Chet Lambert
W4WDR

Thanks to You!

Thanks to all of you who called or wrote to congratulate Grandma (Mea Maw) Teenie and me on our new grandson Joey. It was nice of you to take the time. We both THANK you! Oh yes! I am Paw Paw.

It's Late Again But!

I won't bore you with all of the details.

I did loose about four days due to dental surgery and I am still sore but what the heck, a poor excuse is better than none at all.

I had surgery on Thursday afternoon came home and went to bed. Teenie said when she left for work Friday I was in bed and when she got back I was still in bed. I don't remember Friday at all. From all the comments I have had from those around here and those I talk to each day they said I needed the rest and I must admit, I think I did too.

I have decided, I am not going to worry too much about trying to keep on schedule. When things don't go well, all the worrying I can and do won't change a single thing. So I am going to try not to worry. I do hope you understand and concur with my decision.

BirmingHAMfest '87
May 16 -17, 1987
Birmingham, Alabama

Bulletin Board

Thanks to you all who are now using the bulletin board to upload articles, especially those of you out-of-towners. You don't know how good it is not to have to re-type all those articles. Maybe one of these days I won't have to do so many. I still have to do more than I want but I feel my obligation to you is worth the work. I hope you agree.

I am now looking at several scanners. These, I hope, will allow me to feed the hard copy of articles into the scanner which will send it into RAM of my MAC. I have just played with one for a very short time at our local ComputerLand. Lou, the manager will allow me to try it out when I get time. I will look at several before I spend the money though. They sure are expensive, but I hope I will be able to get one and then I should have more time.

Still Needing Distributors for CTM

I think one of the better ways to get **CTM** going is to get more distributors to handle our magazine. So, if you know or will take the time to contact your local distributor, show him what the magazine is and then have them contact me.

It sure would be nice to get more distributors to let all have a crack at us.

If you can, please do. . .

PC McBridge going well almost

Jim Pittman, KA4PDZ has really been helping me recently and worked hard to get the PC McBridge going. We are able to transfer articles but since most are written in WordStar™, we have had problems with the codes playing funny tricks on us. We did get a copy of a public domain program that is supposed to strip away the WordStar control characters. It hasn't done its job and we have contacted the supplier who is sending us another copy.

I have to do the same thing when I transfer CP/M articles over from my KayPro 10. I have to UNSOFT and STRIP the codes there too, so I know it can be done.

So many of our writers are now using IBM™ or at least the clones, it would be a great blessing to be able to use the articles without having to do too much with them after the transfer. As I have said for years, Oh well, maybe one of these days!

CTM Renewals

I do wish more of you would take time and look at your expiration date on your label. It would be so much help to me not have to go through all I do to get your attention.

Tell the advertisers where you saw their AD!

I am planning on getting some stickers for reminders and that may help.

The post cards notices I have been sending out sure do help and many of you do reply that you just didn't realize your subscription was so close to expiration. So please check and if you are within a month or two, please send in your renewal. And, please send the label from the ***most recent issue***. The number in the upper right corner changes from month to month. And, if I don't get the last label, I have to do a search and if you only knew how long it takes to search for a ZIP code in a CP/M machine when you have to go through thousands of subscribers.

Six Month Subs

It appears the six month subscriptions will be around for a few more months. I have been getting quiet a number of them. I thought it would be a good way for newcomers to get an idea just how good our writers are with a 6 month sub.

I didn't start it for renewals though.

We Still Would Like Our Old Writers BACK

Thanks for the contacts some of you older writers have given me. I can understand some of your reasons, not all of course, but some.

It would be nice, eventhough you don't have time for a column now, a few pieces and articles on as time permits basis would be better than not having you in our pages. I know many of our readers would like to have you back. I know I would.

PRESS Releases

I talked about this (or at least a similar subject) before but I feel so strongly in this, I want to cover it again, and maybe, just maybe, I will touch the consciousness of these individuals.

I think a "New Product" section of a magazine is one of the more important parts of a magazine and when I have space available I like to run the press releases I have. What I don't like if for these companies just to send me the releases. I like to have them to advertise with me too.

There is one company out there, the people there will recognize I am writing about them, that only send me their press releases and get the free advertising and I cannot get their ads. If they would only advertise with me some, then I wouldn't have these bad thoughts. I just cannot continue to run these releases without balancing some of them with ads. We have and are running articles with their equipment in them. I guess their thinking is with the articles and the free press releases they don't need to pay me for ads. Not so. . . I do hope that they and you understand my meaning. I may not be explaining my feelings as I should but I can only do with what I have.

This brings me to the advertisers of Timex/Sinclair wares. I just can't understand it. If you count the number of pages and articles we have here in **CTM** and then the other publications, you will find we still have more. However, we **don't** have the advertisers backing. I do realize that most of you Timex/Sinclair users subscribe to all of the T/S magazines and when you do purchase items, you tell them, or perhaps told them, you saw their ad in XXX magazine. Nothing wrong with that, but it seems the advertisers have followed the other magazine(s) leaving me standing with empty pages.

Last year at the T/S Computer Fest I had promises from many of the dealers for advertising, but they didn't follow through. I don't want to and don't like to "hound" people about anything. I take people at their word as I live by mine. That may well be the problem, all people may do like I try to. Regardless please them where you saw their ad especially if they are advertising in **CTM.**

Actually in the third paragraph, I am talking more than one company.

IEEE Computer Show

Remember a couple of years ago I had words with the show producers over my booth or rather the lack of it at the IEEE Computer show in Huntsville, Alabama.

They recently had another and didn't contact me as a potential exhibitor or even let me know for our "Comming Events" column. Strange how people are. They lost out on exhibitors because it wasn't in our CE column.

From those I talked with who attended, it was a good show and for that I am grateful. But it sure seems strange they didn't send me a notice for the CE column.

People sure are funny and some just don't want to swallow pride and help their organizations. Oh well, those of you who are readers and are associated with the IEEE in Huntsville, please tell them to let me know next year so I can let others know.

Some individuals here in Birmingham were wanting to attend but didn't know when it was.

Reproduction of Articles in CTM

On page seven of each issue I have a statement saying articles in **CTM** cannot be reprinted without permission. I have (had) some standing approvals for some to do so, **but I must change that.**

One magazine recently reproduced an article, a good one of course, without contacting me or the author *and the author didn't like it one bit.*

So please check with me before your reproduce any articles from now on.

CTM needs a Software Program

I have heard there is a software program out there somewhere that would allow me to do electronic schematics on my Mac. Do any of you know of such a program and where I can get a copy. I think I was told it was by someone in

Florida. And, since more of the **CTM Family** live in Florida than any other state, I bet one or more of you know where I can get it. I would be most happy for the information.

If there is such a program out there and I can get a copy, I may be able to do a review for you all. I get many schematics which are hand drawn and I don't have time to re-do them and a few of them have appeared in the pages of **CTM** but many of the articles haven't since I just don't have time to re-do them. Just thought I would ask.

Past Shows

Tropical Hamboree

Miami Hamfest was the first of the big hamfest this year. It is a very nice way to start the show year. Evelyn Gauzens, W4WYR sure knows how to put on a good show.

This year seemed to be about the same size as last year. I would guess there were 9000 plus attendees. And that comes from others, I didn't get to be there Saturday.

We had some van problems, rather we thought we did. We heard some noise in the rear of the van and Teenie wanted me to have the brakes checked. To make a long story short, I got to the hamfest 5 minutes before it closed on Saturday.

Sunday, I was extremely busy trying to make up for the lost Saturday.

Another excellent part of Hamboree, is Sandi Parker, KF4MI who heads up the fantastic crew who keeps we dealers in food. It is difficult to understand how hard she and the lovely ladies (and some men) do all they do for us. I can't speak for everyone but Teenie and I sure do enjoy all the fine food. I could say the food is out of this world, but then it sure would be difficult to get delivery. And, Sandi and her crew sure do deliver.

You know how much interest I have in RVs. There were 158 RVs there with full hook-ups and probable 25 more or so which were dry camping. I think there were more RVs there than I have ever seen at any of the other shows and I have been to many over the past five plus years.

I guess there were around 75 plus exhibitors and from what I have heard most did quiet well there. The flea market was about the same as last year around 600 plus tables. I got around to them all but I sure didn't have time to do much looking and no buying.

The most disturbing thing that happened was the number of thefts there. I have heard some real high numbers and I won't repeat them. They had uniformed security there but most of the times I saw them they were walking and talking to each other. I suspect they need more.

Another suggestion I have would be to require receipts at the doors when people leave the area. I know it would be an hardship on most dealers but if that is what is needed, then so be it. Even with that, it sure could be difficult to keep track of all of the HTs that are there.

I just talked to Evelyn Gauzens who confirmed they would be requiring receipts at the door when people left and they would have more security there next year. She did tell me of other ideas but I won't repeat them at all. What the crook(s) don't know will be good for us all. Go get'em Evelyn. Will see you next year!

Jackson Hamfest

Teenie and I drove over to Jackson Hamfest. This is a small hamfest but a good one. Teenie and I enjoyed it. There were only about 5 exhibitors and 40 - 50 swap tables.

One of the nice things about Jackson are the nice people there. They make you feel as thought you would be sorely missed if you weren't there. One of the best things that happened was we got to meet our friends again from Vicksburg; Bill Ford, WB5SXK, Bill Legg, W4MKS and Brent Lamb K5VXV, Bob Marr, WB5-YKR and some others which I can't remember, sorry guys.

Saturday was a good day but Sunday the crowd was small. It's a good bet it was due to the weather which wasn't good at all. About 10:30 there was a real large clap of thunder. I told Teenie for us to get packed up and go home. We did and tried to outrun the rain but we didn't. When we got home it was raining real hard.

Coming Events

Orlando HamCation

This will be the next hamfest for us. Teenie, Christie and I will be going. As I have said previously, I am not looking for an outstanding fest. I sure hope I am wrong and I hope next month I can tell you how *great* it was!

Teenie and I stopped in Orlando on the way down to Miami to eat. I called Al Huber and he and Sarah came over to the restaurant to see us. We made plans for the five of us to go to Epcot while we are there.

Since Al and Sarah don't have any responsibilities we plan on having a *ball* with them. They are what you call good people.

Charlotte Hamfest

This is another of those hamfest Teenie and I look forward to. Normally, this is one of the better shows of the season. I sure hope this year won't be any different.

They will have around 5000 people or so with around 50 - 75 dealers and 600 plus swap tables, so you can see, why it is such a good show.

Plan now! on attending our BirmingHAMfest May 16 -17 at our new location, the Boutwell Auditorium Come by and see us there!

By Buck Rogers, K4ABT

Converse and Transparent

How to monitor 2 PACKET frequencies with one KPC/tnc and one terminal

I am sure glad to see the beautiful days of spring approaching. I have had several winter projects to complete, and they are all completed except the Dick Smith Electronics 440 mhz. (70 cm) kit. I will have more on it in a later issue.

I have a rather strong psychique, It warns me of impending duties, responsiblities, and sometimes it will allow me the preiminence of good fortune. As recent as the middle of this month, I awoke at 3am and sat erect in the bed with an awareness of something that I had to do, and do it quick.

That notion was my CONVERSE and TRANSPARENT column! How could I have forgotten that? Well, seems I have been on the run a lot lately. South America and a few other stops in between, not to mention the building of the Dick Kinney Video Digitizer kit, and the DSE 440 kit.

I lay back on the pillow and decided to let my subjective explore for the subject of this months CONVERSE & TRANSPARENT MESSAGE. (CTM for short, look at that Chet; ever thought about "*Converse & Transparent Magazine*")

Believe me, that is just what happened. Saturday morning, I woke up at the usual time but this morning was unlike any in the last six months. I had a dream, and it was looming there in front of me more like a vision. I didn't even stop by the kitchen for coffee, where Jean Ann (WB4EDZ) had breakfast pipeing hot.

Instead, I went directly to my computer room, pulled out the Kantronics Manual to check and see if the audio input to the KPC-2 was isolated. To my pleasure and satisfaction, the Kantronics' engineers had spared no expense, and placed C-17 just where I needed it.

As you can see in Figure 1, the audio is fed into the Kantronics KPC-2 via pin 5 of the DB-9 Connector. Now if you observe the microphone connector of the ICOM 27 A in figure 2, you will notice the receive audio output can also be extracted via pin 8. This is one way to make a one cable connection to your radio, if you own an ICOM 27A, 27H, 28A, 28H etc. (check your schematic)

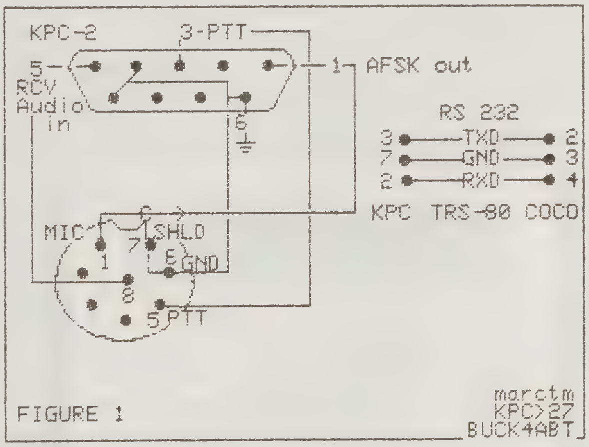
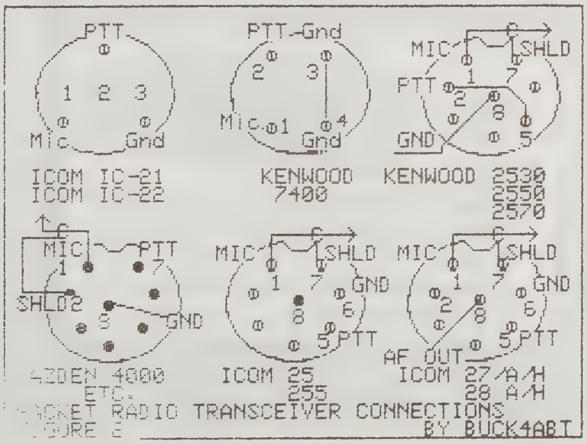


FIGURE 1



PACKET RADIO TRANSCEIVER CONNECTIONS
FIGURE 2

Once all this is complete, you notice that a 3.5 millimeter phone jack vacant on the rear of the Kantronics KPC-2, KPC-1, etc. Here is where my brainstorm had emerged to/from. I have several scanners, some of them have 3.5 mm jacks in them for audio output. I looked at the manual to be sure the ground is not "chassis hot" and then I checked to be sure the output is also isolated with a capacitor or transformer. Since the input to the Kantronics Packet Communicator is isolated by C-17, a .001 mfd ceramic capacitor, I felt safe knowing that I would not be putting dissimilar (imaging) potentials against one another.

Now we here in Warner Robins, Georgia have two (2) dedicated Digipeaters. One is the through-put 145.010 MHz Digi. The second is the LAN Digi, on 145.050 MHz. Sure, I have CoCo's, model 100's and a Tandy 100 PC clone, and that is the point. I do not have room for another dedicated Packet terminal. So, I have taken the output of one of the scanners, and fed the audio output to the same KPC/tnc which is attached to the ICOM 27A.

This gives me a way to monitor both frequencies with one KPC and one terminal. If I am in a QSO on 145.01 I will have the MC OFF, and I only see the station to which I am connected. Now if I get a connect request I can generally determine which frequency I received the request on, via the tiny monitor speakers that are attached to the audio outputs of each source. This will allow me to return the call to that station, by switching my ICOM 27A to that frequency after I complete my QSO.

There is one shortcoming, if I am in QSO and the (locked-on) scanner frequency becomes busy, then the KPC does not know the difference in the two sources of packets. This will cause it to wait or listen, thus it behaves as though it hears a busy frequency. There is an easy cure for this, if you want to continue your QSO and not have the station on the other end timeout. Just reach out and turn the scanner audio down/off. It's that simple.

The audio level setup is the same as that for the transceiver. With the scanner on, and locked to the secondary frequency to be monitored, open the squelch and adjust the volume until the RCV led is on, then close the squelch and you are ready to fill up the display.

Now I know that many of the readers don't wish to run right out and purchase a scanner, so you do the next best thing. I decided to try an inexpensive VHF FM tunable receiver. It worked, but it was broad. (bought it at a garage sale for $5 bucks) But remember, whatever you use, must have a squelch control, and have it properly adjusted.

I do hear the audio from the secondary receiver coming through the speaker of my transceiver. (primary receiver). This is because the two audio systems are in effect, connected parallel at the KPC/tnc.

NOTE * If there is any question about the "isolated" audio output from the secondary receiver. Then use an electrolytic or tantalytic of about 4 mfd in series with the audio from the secondary receiver.

Proceed with caution!

So until next month, 73' ....and Please support your local PACKET organization, by being a DOER along with, being a USER. By all means, support The Number One Source of PACKET information, " CTM "!

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By Oscar Sensabaugh, R.O.C.

Computin in the Country

Is our language turning into Alphabet Soup?

Think computer prices have fluctuated wildly lately? Well, think again, and read *HIGH TECHNOLOGY* Magazine fer March 876, which has one heck of a good precentage of computer articles. Plus a very timely insight from Lee A. Iacocca. Learn, among other things, that ADJUSTED FOR INFLATION, computer costs have remained constant at around $200 bucks per pound for some 30 years! I wonder if ENIAC ever got paid for!

Which drags us into acronyms, them dang combinations of initials to form newe words. You gotta learn them things, because one of these days somebody is gonna disregard the convenion that the dang thing is supposed to be spelled out proper the first time it is used, after which the acronym is acceptable. I reckon this convention was adopted back when it saved scarece RAM space and just hung on even if RAM chips are now about a dime a dozen. Incidentally, I just now ignored the convention, but everybody knows what RAM means.

It ain't gonna be long before there's a demand for a Acronym Dictionary. Fer example, whenever I run across the one fer North American Presentation Level Protocol (NAPLPS), a glitch in my personal RAM insists on poking an extra "I" into it which yields a graphic image of kissing a gal with a moustache which plumb crashes the whole system! In other words, acronymn can be plumb dangerous to what passes for sanity these days; they should be "documented". You can get in trouble outside your field, too.Thee and me knows dang well thar AI is Artificial Intellegence, but a rancher will come up with a different answer, as will a sheep herder when confronted with RAM.

State Of the Art (SOTA) gets a lot of play nowadays, and I have just come up with a new one, "PG" Past Generation which is also expressed as SORTA-1 (or -2 or -3, whatever).

I prefer the SOTA (plain, + or -) form which can be used as a device classifying memdium and will surely prove as useful in the future as NAPLIPS. SOTA is todays gadget, yesterdays is SOTA-1, and vaporware somewhere in the wild blue SOTA+.

THAT DON'T MEAN THAT ANYTHING sota-x should be discarded, SOTA-x might be upgraded to SOTA by improved software or hardware extention. Like, for example, hanging an improved keyboard on a ZX-81 would move it closer to the desirable SOTA would move it closer to the desirable SOTA class, but the Z80 chip relegates it eternally to a SOTA- status. Other items, eternally to a SOTA-status. Other items, like software to unleash the full power of the sinclair QL are mostly in the SOTA+ class for now but may become SOTA soon. And hopefully at less thatn $200/lb.

I just recently got an extensive report (from a reader) on a gadget that would appear to fall into the SOTA-1 class, but might be fun to play with despite its shortcomings. The reader called my attention to the Oberon text scanner available from JADE COMPUTER (and other companies) for $179 (interface kits for IBM or Apple Mac $29). Said reader commented that among the obvious limitations were lack of speed, high error rate, inability to read my column (be nice now), inability to digest proportional spaced copy, etc., etc. He concluded that while the gadget might never be considered "cost effective", it might be worth the price as a "technical curiosity". And if anybody wants to try to build a "better mousetrip", a 1728 element "Linear Image Sensor" is available from TIMELINE, Inc., (1490 W. Artesia Blvd., Gardena, CA 902470 for $29.95. Tell them you heard about it from the Retired Old Codger in **CTM.**

Threes on ya!

P.S. How come old Chet aint listed the upcoming "Sinclair Shindig" in Indianapolis! Did the committe fergit to notify him. BCNU, I hope.

Oscar Sensabaugh, R.O.C.
801 N 7th Street
Ballinger, TX 76821 **CTM**

(Oscar and others I won't put a listing for a upcoming show until I get written informaton to fall back on. I remember in the early days, I copied information from another magazine and they had the wrong information so I did too. One of my readers went to the show that wasn't and wasn't very happy about it. Can't say I blame him. From then on, if I don't have it in writing, it won't make **CTM.** It much safer that way. After all, **CTM** is much more than a few sheets of paper now and the readership is in multi-thousand and a mistake could be hard to explain.

CTM

By P. C. Cothran

With Holding Tax, Using Symbols

At times, the question "why bother with THAT?" is a valid question, as was asked the mountain climber: "why do you climb that mountain?" The answer of the mountain climber could apply: "Because its' there."

The Internal Revenue Service is not a mountain, sometimes it appears to be a mountain covered with paper, but this is illusion. It operates under laws passed by our Congress, signed by our President, and publishes a large variety of tax booklets. Lack of knowledge of the tax law can seriously impact your bankroll, or pocket.

This program, published under a different title some time ago, uses information only you can provide to come up with a with holding tax estimate. By inference, withholding tax is a good indicator of what you must pay in April.

The difference in this program is that you will only enter it once. Subsequent changes in the Income Tax booklet, Circular "E", current date January 1986, will have to be entered, an easy job in the initialization tables included in the program.

By using symbols "AAA" through "NND" all the fixed values published in the circular are included, without conflict with the other, operating variables also in the program.

Yes, I had a problem initially in adapting this to be a "universal with holding tax" program, but I think that I succeeded. Your comments will help to purify this program as well as any others published.

The program allows for weekly, biweekly-weekly, twice a month, monthly, quarterly, semiannual and annual pay. An amount of confusion exists on percentage of your pay that Uncle Sugar is going to take. Figures are quoted rather loosely even by some of our incumbent (did NOT say "incompetent"!) Congressmen. [On this, the day before a national election, with a home in Alabama, you can see that I am disgusted with the innuendo and outright lies published in all of the media in the name of "the candidate". And my own party is also guilty of the same tactics, but not so flagrantly. I believe you, Mo Brooks, fine house representative, not your opposition.]

Those who quote figures "loosely" can benefit: Bob Heinlein has said "If it can not be expressed in figures, it is not "business", it is an opinion." My corollary to this is "and not a very good opinion." The highest rate figure published by the Federal Government in the official publication, Circular "E", January 1986, is "37 percent", with an add on. There is no way I can misquote this to "50 percent", or more, as has been done in the media.

The add-on is fixed for each bracket, the percentage is also fixed for each bracket. The brackets vary like this:

Bracket	Percentage Add-on
(Single Tax Table)	
less than 1480	0 0
1480 - 4500	12 0
4500 - 10000	15 362.4
1000 - 15720	19 1187.4
15720 - 23740	25 2274.2
22740 - 30000	30 4279.2
30000 - 35710	34 6157.2
35710 - no limit	37 8098.6
<Married tax table)	
less than 2600	0 0
2600 - 10350	12 0
10350 - 20670	17 930
20670 - 25470	22 2684.4
25470 - 31180	25

	3740.4
31180 - 36900	28
	5167.9
36900 - 48340	33
	6769.5
48340 - no limit	37
	10544.7

How anyone can misquote such a table is unknown to me, Mr. Kennedy.

Of interest (to me) was the difference between the single and married tables. Wrote a program that came up with both figures, same pay, same deductions, only difference was the two tables, and came up with an appreciable difference between the two.

Then varied the amount of pay in inc'ents of 1,000 per year, same program a little modified, and found that a sizeable percentage difference existed.

If you wish to get a copy of these additional programs, you must write and ask. It would help to receive a disk, hopefully initialized and without a system track. If your computer is DSDD, 80 tracks, I can put your disk in drive "B" and move the files to your disk. Yes, it would help to include a mailer with return postage on it.

You will note that the program shows a fall-through table, with low and high limits, and IF-THEN statements. The same approach works on actuary tables (insurance), bank rates (banking, loan institutions), and even in the physical sciences. Useful.

Don't expect these digits to last beyond the next publication of Circular "E". Enter the digits as shown under the tables, above, into the program once, then use until Circular "E" changes (about once every three to four years, if congress leaves it alone).

One more note: you will see an apostrophe (') used in place of REM. Saves two bytes each time used. Not so much in this program, a lot in others.

Enough of my philosophy!

```
    10 ' FROM IRS CIRC. "E", JAN 1986
    20 LET CL$=CHR$(26) ' CLEAR SCREEN IN KAYPRO
MBASIC
    30 PRINT CL$
    40 LET AAA=1480:AAB=4500:AAC=.12:AAD=0
    50 LET BBA=AAB:BBB=10000:BBC=.15:BBD=362.4
    60 LET CCA=BBB:CCB=15720:CCC=.19:CCD=1187.4
    70 LET DDA=CCB:DDB=23740:DDC=.25:DDD=2274.2
    80 LET EEA=DDB:EEB=30000:EEC=.3:EED=4279.2
    90 LET FFA=EEB:FFB=35710!:FFC=.34:FFD=6157.2
    100 LET GGA=FFB:GGC=.37:GGD=8098.6
    110 LET HHA=2600:HHB=10350:HHC=.12:HHD=0
    120 LET IIA=HHB:IIB=20670:IIC=.17:IID=930
    130 LET JJA=IIB:JJB=25470:JJC=.22:JJD=2684.4
    140 LET KKA=JJB:KKB=31180:KKC=.25:KKD=3740.4
    150 LET LLA=KKB:LLB=36900!:LLC=.28:L4=5167.9
    160 LET
MMA=LLB:MMB=48340!:MMC=.33:MMD=6769.5
    170 LET NNA=MMB:NNC=.37:NND=10544.7
    180 LET G$="NO LIMIT":LET N$=G$
    190 LET R$="ANY KEY TO RESUME PROGRAM."
    200 GOSUB 1190
    210 PRINT CL$
    220 ' TAXTABLE. PC/3/18/84. FROM IRS CIRC E,
JAN 1986
    230 PRINT"<<<<<<<<<<<< COMPUTATION OF
FEDERAL WITHHOLDING TAX>>>>>>>>>>>>>"
    240 PRINT:PRINT:PRINT
    250 LET EX=1080:W=100:W2=1000:Z=.5
    260 GOTO 530
    270 ' SINGLE TAX TABLE
    280 IF P<AAA THEN LET T=0
    290 IF P<AAA THEN RETURN
    300 IF P>AAA AND P<AAB THEN LET T=((P-
AAA)*AAC)
    310 IF P>BBA AND P<BBB THEN LET T=((P-
BBA)*BBC)+BBD
    320 IF P>CCA AND P<CCB THEN LET T=((P-
CCA)*CCC)+CCD
    330 IF P>DDA AND P<DDB THEN LET T=((P-
DDA)*DDC)+DDD
    340 IF P>EEA AND P<EEB THEN LET T=((P-
EEA!)*EEC)+EED
    350 IF P>FFA AND P<GGA THEN LET T=((P-
FFA)*FFC)+FFD
    360 IF P>GGA THEN LET T=((P-GGA!)*GGC)+GGD
    370 LET T=INT(T*W+Z)/W
    380 PRINT"P=";P,"T=";T,"T/26=";T/26
    390 RETURN
    400 ' MARRIED TAX TABLE.
    410 IF P<HHA THEN LET T=0
    420 IF P<HHA THEN RETURN
    430 IF P>HHA AND P<HHB THEN LET T=((P-
HHA)*HHC)
    440 IF P>IIA AND P<IIB THEN LET T=((P-IIA)*IIC)+IID
    450 IF P>JJA AND P<JJB THEN LET T=((P-
JJA)*JJC)+JJD
    460 IF P>KKA AND P<KKB THEN LET T=((P-
KKA)*KKC)+KKD
    470 IF P>LLA AND P<LLB THEN LET T=((P-
LLA)*LLC)+L4
    480 IF P>MMA AND P<MMB THEN LET T=((P-
MMA)*MMC)+MMD
    490 IF P>NNA THEN LET T=((P-NNA)*NNC)+NND
    500 LET T=INT(T*W+Z)/W
    510 RETURN
    520 '
    530 INPUT "ENTER YOUR INCOME PER PAY
PERIOD: ", PAY
    540 PRINT
    550 PRINT "DOES ";USING "$$#####.##";PAY;:PRINT
" INC
    LUDE ANY NON-TAXABLE INCOME?"
    560 INPUT Y$
    570 IF Y$="y" THEN PRINT"USE CAPITALS,
PLEASE":GOTO 530
    580 IF Y$="Y" THEN PRINT "HOW MUCH NON-
TAXABLE PAY?"
    590 IF Y$="Y" THEN INPUT NT
    600 LET PA=PAY-NT
    610 PRINT CL$;
```

```
620 PRINT"WHAT IS THE PAY PERIOD  FOR THAT ";
USING "$ $#####.##";PAY;:PRINT " ?"
630 PRINT
640 PRINT"<52>=WEEKLY"
650 PRINT"<26>=BI-MONTHLY"
660 PRINT"<24>=TWICE E MONTH"
670 PRINT"<12>=MONTHLY"
680 PRINT"< 4>=QUARTERLY"
690 PRINT"< 2>=SEMI-ANNUALLY"
700 PRINT"< 1>=ANNUALLY"
710 PRINT"<<FOR DAILY COMPUTATION, SEE IRS
CIRC. E, JAN  1986>>"
720 PRINT: INPUT "YOUR PAY PERIODS PER YEAR
= ",TF
730 PRINT
740 LET INC=PA*TF
750 PRINT"(M)ARRIED OR (S)INGLE, FOR I.R.S.
PURPOSES?"
760 INPUT M$
770 PRINT
780 PRINT"HOW MANY ALLOWANCES
(DEDUCATIONS) FOR THE I.R.S.?"
790 INPUT DED
800 LET P=INC-(DED*EX)
810 PRINT"P=";P,"INC=";INC,"DED*EX=";DED*EX
820 IF M$="S" THEN GOSUB 270
830 IF M$="M" THEN GOSUB 400
840 LET M1=INT((T/TF)*W+Z)/W
850 IF M$="M" THEN LET M$="MARRIED"
860 IF M$="S" THEN LET M$="SINGLE"
870 PRINT CL$;
880 FOR I = 1 TO 66:PRINT CHR$(159);:NEXT:PRINT
890 PRINT "<<<<<<<<<<<<<<<<   PAY COMPUTATION
BASED ON YO
UR INPUT   >>>>>>>>>>>>>>>"
900 PRINT "GROSS INCOME = ";TAB(30) USING
"$$####.##";PAY
910 PRINT "NON-TAXABLE INCOME ="; TAB(30)
USING "$$#####.##";NT
920 PRINT TAB(30) "  ========"
930 PRINT "TAXABLE PAY ="; TAB(30) USING
"$$#####.##";PA
940 PRINT TAB(35) "X";TAB(38) USING
"##";TF;:PRINT "Pay periods"
950 PRINT "ANNUAL PAY ="; TAB(30) USING
"$$#####.##";INC
960 PRINT
970 FOR I = 1 TO 66:PRINT CHR$(255);:NEXT:PRINT
980 PRINT CHR$(255);TAB(19) "STATUS
=";M$;TAB(66) CHR$(255)
990 PRINT CHR$(255);TAB(19) "ALLOWANCES
CLAIMED = ";DED;TAB(66) CHR$(255)
1000 FOR I = 1 TO 66:PRINT CHR$(255);:NEXT:PRINT
1010 PRINT
1020 FOR I = 1 TO 66:PRINT CHR$(159);:NEXT:PRINT
1030 PRINT "<<<<<<<<<<<<<<<<<<   FEDERAL
INCOME TAX COMPUTATION >>>>>>>>>>>>>>>>>>"
1040 PRINT
1050 PRINT "TAX PER PAY PERIOD = ";TAB(30)
USING "$$#####.##";M1
1060 PRINT TAB(35); "X";TAB(38) USING
"##";TF;:PRINT " Pay periods"
1070 PRINT TAB(30) "  ========"
1080 PRINT "ESTIMATED TAX PER YEAR =
";TAB(30) USING " $$#####.##";T
1090 PRINT
1100 FOR I = 1 TO 66:PRINT CHR$(159);:NEXT:PRINT
1110 INPUT "DO YOU WANT TO DO ANOTHER
COMPUTATION";ANSWER$
1120 IF LEFT$(ANSWER$,1) = "Y" OR
LEFT$(ANSWER$,1) = "y" THEN 30
1130 PRINT CL$
1140 FOR X=1 TO 12:PRINT:NEXT X
1150 PRINT TAB(30)"Saving 'TAX00.BAS'"
1160 SAVE "TAX00",A
1170 FILES
1180 END
1190 ' Single Tax Table, check table
1200
PRINT"AAA=";AAA,"AAB=";AAB,"AAC=";AAC,"AAD=";AA
D
1210
PRINT"BBA=";BBA,"BBB=";BBB,"BBC=";BBC,"BBD=";BBD
1220
PRINT"CCA=";CCA,"CCB=";CCB,"CCC=";CCC,"CCD=";CC
D
1230
PRINT"DDA=";DDA,"DDB=";DDB,"DDC=";DDC,"DDD=";DD
D
1240
PRINT"EEA=";EEA,"EEB=";EEB,"EEC=";EEC,"EED=";EED
1250
PRINT"FFA=";FFA,"FFB=";FFB,"FFC=";FFC,"FFD=";FFD
1260 PRINT"GGA=";GGA,"GGB=";
G$,"GGC=";GGC,"GGD=";GGD
1270 ' Married Tax Table, check table
1280
PRINT"HHA=";HHA,"HHB=";HHB,"HHC=";HHC,"HHD=";HH
D
1290 PRINT"IIA=";IIA,"IIB=";IIB,"IIC=";IIC,"IID=";IID
1300
PRINT"JJA=";JJA,"JJB=";JJB,"JJC=";JJC,"JJD=";JJD
1310
PRINT"KKA=";KKA,"KKB=";KKB,"KKC=";KKC,"KKD=";KK
D
1320
PRINT"LLA=";LLA,"LLB=";LLB,"LLC=";LLC,"LLD=";LLD
1330
PRINT"MMA=";MMA,"MMB=";MMB,"MMC=";MMC,"MM
D=";MMD
1340
PRINT"NNA=";NNA,"NNB=";N$,"NNC=";NNC,"NND=";NND
1350 PRINT
1360 PRINT R$
1370 LET JJ$=INKEY$:IF LEN(JJ$)=0 THEN 1370
1380 RETURN
```

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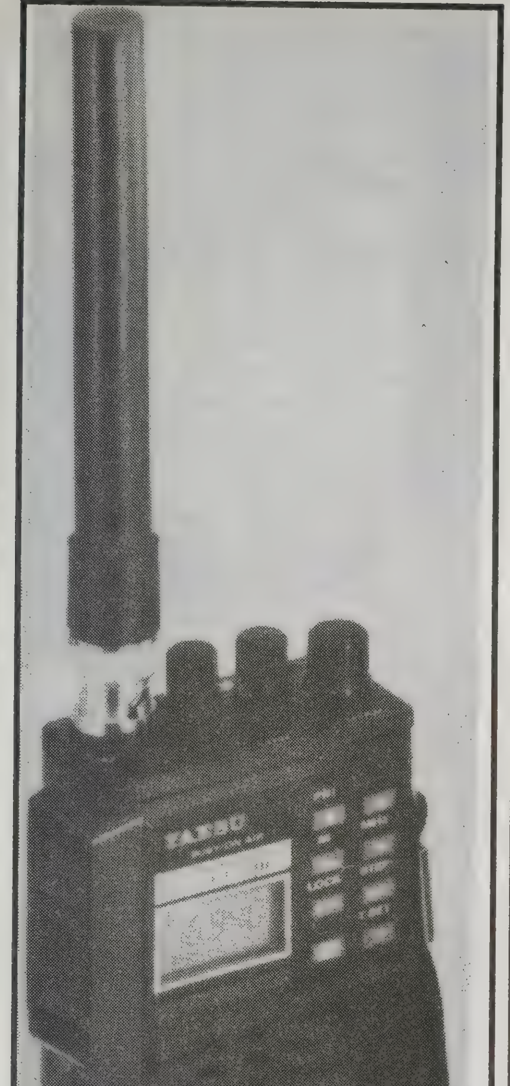


FT-23R 144MHz

By Steve Hanselman, KC4SW

Yaesu's

FT-23R & FT-73R

A Review of these two new hand size HT's 144 MHz & 440 MHz

Well I finally convinced Chet that the two new YAESU handi-talkies, the FT-23R and FT-73R, really needed to be done in one review while these two unit are quite small I found that they had exceptional performance.

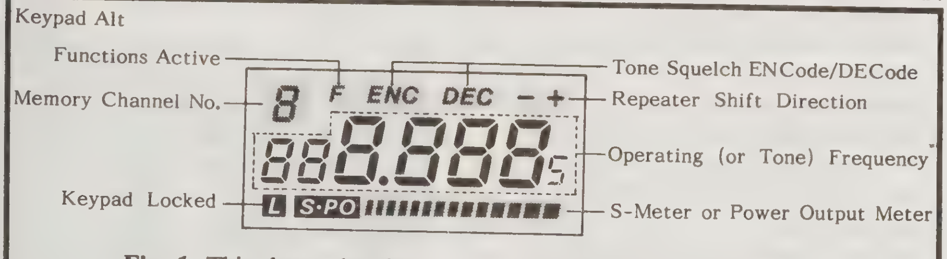


Fig. 1. This shows the display with all of the various indicators

THE "FRONT PANEL"

You really can't tell which radio is which at a glance as both the FT23 and the FT73 look exactly alike, well almost, only the small label saying UHF or VHF. To put one of these "hand -fulls" on the air is almost too easy. These two radios sport features that remind me more of a mobile radio rather than a handie-talkies. Instead of having to push buttons or set digi switches you enter the frequency by spinning a dial or by operating two pushbuttons that are very similar to your up/down buttons on the mobile mike. By using the **"F"** button these up/down buttons will also move you up or down 1 Mhz at a time. The next button is labeled **"REV"**/**"STEP"**, the **"REV"** will allow you to go from "right side up" to the "upside down" mode very easily. With the **"F"** and then **"STEP"** you swap between the two step rates for the VFO mode. On UHF these are 12.5 Khz and 25 Khz and on VHF 5 Khz and 10 Khz. Next is the **"D/MR"** and **"M"** button this one toggles between the VFO and MEMORY. The dial mentioned above changes the frequency in VFO mode and the memory channel in MEMORY mode. In order to store a channel in memory you dial up the frequency desired and the press the **"F"** and then **"M"**, finally select the memory channel of choice and press the **"M"** key again and the channel is now stored. Offsets are set for the standards of ±600 Khz on VHF and ±5 Mhz on UHF. These are selected by pushing the **"RPT"** button this will toggle between simplex, plus, and minus. Memories 0 thru 6 will store separate receive and transmit frequencies. You do this by first storing the receive frequency and then selecting the transmit frequency. Next you push the **"F"** and then **"M"** and then hold down the PTT while pushing the **"M"** again. For odd splits the **"+-"** on the display will both be lit up.

There is a monitor switch that is located just above the push-to-talk switch. This switch allows you to monitor the channel before you transmit. It does this by opening the NOISE squelch, a problem is that if the TONE squelch is installed and operating you will not hear anything that does not have the correct sub-audible tone.

Radio shown actual size

These radios also have a power-saver feature. When the channel is clear and the squelch is closed the receiver is turned off for 600 Ms and then back on for 300 Ms this really doesn't bother the receiver's operation, but does allow for longer battery life. Remember in scan mode the radio scans faster than this so it shouldn't really interfere with normal operation.

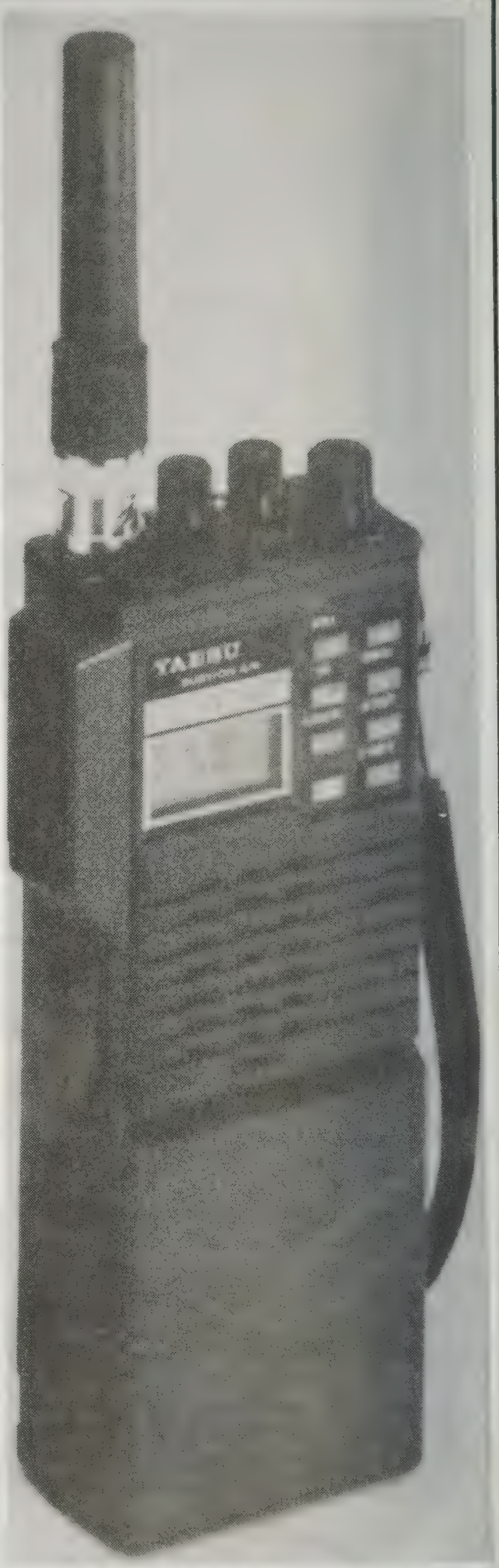
Last but not least when one of the buttons on the control panel is pushed there is a beep. When the battery runs down (discharges to approx. 80% of full charge terminal voltage) a beep will sound continuously. This is a rather strange sound when it starts at 10 or 11 o'clock at night after you're in bed.

The FT-23R A very Small 2 Meter Handie-Talkie

The FT-23R covers the 2M ham band from 144 to 148 MHz. Power out is an advertised 5 watts with the hi voltage battery pack and 2.5 watts with the low voltage pack. Receive sensitivity is stated as .25 MicroVolt for 12 dB SINAD. We'll see how the test unit compares a bit later on. One of the impressive points of this handi-talkie is the small size, it's just a bit more than a handful. Now I am sort of big but even so I think you'll be impressed by the size as the FT-23 only measures 5.5 inchs high, 2 inchs wide and 1.25 inchs deep. This will increase to about 6.5 inchs tall when the add-on DTMF package is attached to the radio.

HOW DOES IT WORK

Putting the FT23 on the air is a very simple procedure, turn it on and spin the dial. When you find the channel you want, set the offset and then start talking. I did find that this radio exhibited the same "problem" that the FT-727 has. On two meters the receiver hears the leakage from the cable TV system very very well. *So again with this hand-held be careful before you suspect a radio problem, move to another location and check it again.* It is most likely a leaky cable TV cable (of course if you don't have cable service in your area this won't apply. hi hi). I programmed it for the local repeaters and began to "have at it". This is one sweet little radio. I could hit all of our local boxes even the ones that are a bit out of town. I think that the most impressive operational point was shown up during my testing of another project here in the shack. I am building a UHF remote base and while I had the FT-23 I decided that it would be the ideal time to do the on the air 2M tests. I operated thru the remote with the FT-73 (you've got to read on to hear about the FT-73) out of the remote on the



FT-73R 440 MHz

input to a local (about 3 mile away) repeater and then listened to the result on the FT-23. This meant that I had two UHF radios one at 2 watts and one at 20 watts along with a VHF radio at 10 watts operating in close proximity to the FT-23. In addition the VHF radio was only 600 Khz off the channel that was programmed into the FT-23. During all of the testing I didn't have any problems (well almost any it is real easy to get the audio up high enough to get some brutal feedback). Later on we tried this set-up on the repeaters located about 20 miles away with the same results. I know this doesn't seem to scientific way of looking at a unit but the results were very impressive.

Test Bench Performance

The FT-23 on the bench lives up to all of the claims made by YAESU. On the spectrum analyzer (a Tektronix model) the output was clean down to greater than 60 dB from carrier frequency. Measurements were made by using power attenuators attached directly to the radio and then feeding the output of the attenuators into the spectrum analyzer Power outputs were slightly higher than spec. At high power the readings were 3.4 watts at 144 MHz and 3.2 watts at 148 MHz. Low power was .25 watts at 144 and .24 watts at 148. These readings were made with a Serria thruline wattmeter into a Bird Termaline dummy load. The Serria meter is known to be somewhat stingy in it's readings. The battery terminal voltage was 8.02 volts. A check in the manual shows that the radios are rated at 2.5 watts hi-power with the 7.2 volt battery pack. If you use the optional 12 volt pack the power out is spec'd at 5 watts. The receiver is rated at .25 uV for 12 dB SINAD I do not have the tool to measure SINAD so I look at just the old 20 dB quieting method. Using this method the radio showed up at 0.2 uV for 20 dB quieting. These reading were made on a Hewlett Packard 608C signal generator.

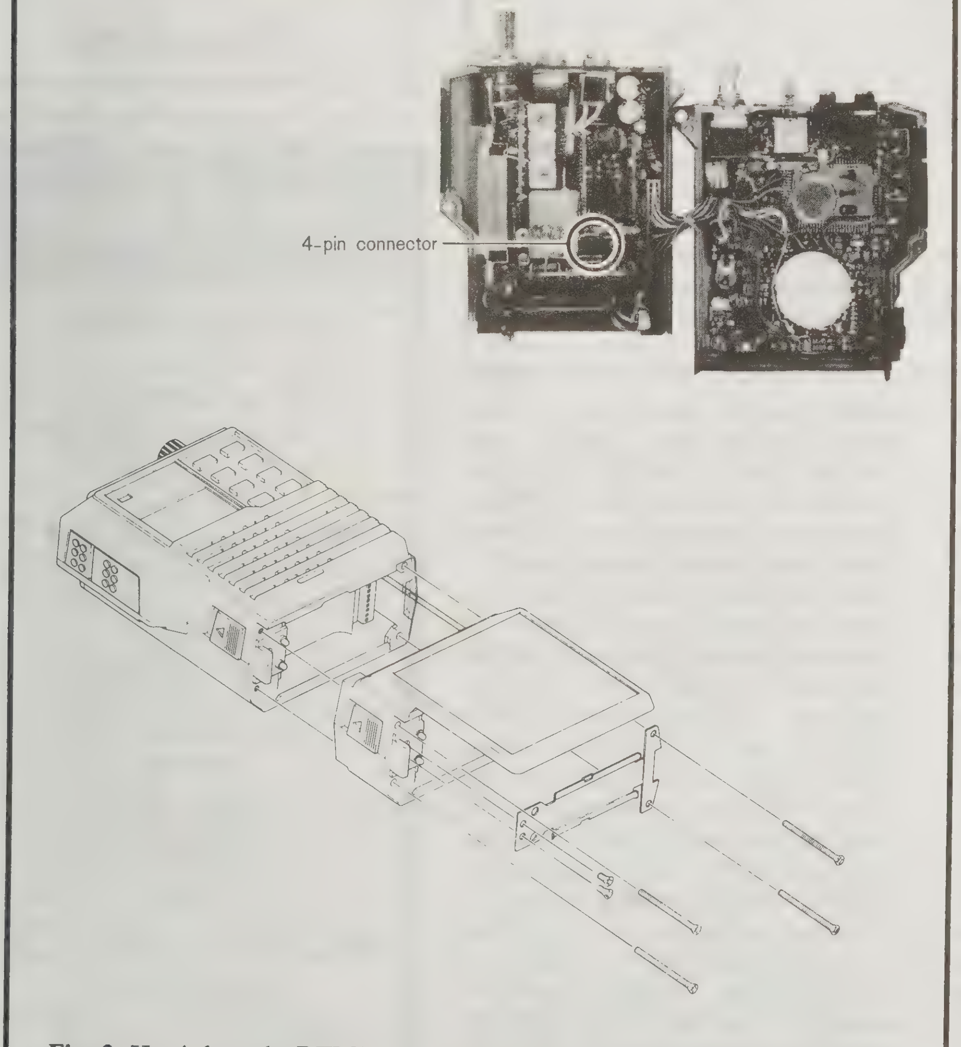


Fig. 2. Here's how the **DTMF** pad is attached to the radio. Take note of where the plug goes "inside" the radio.

The FT-73

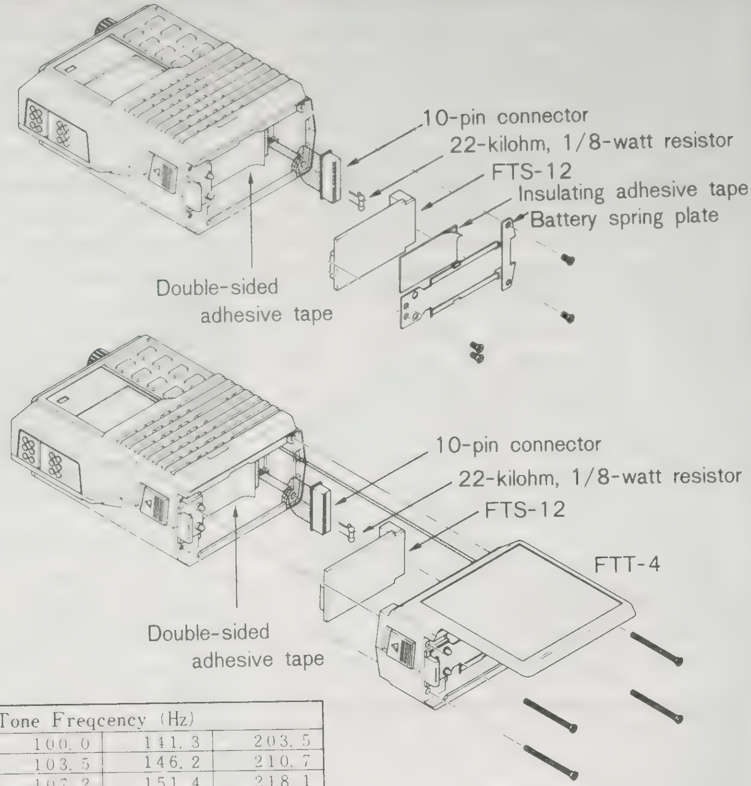
The FT-73 operates just exactly the same as it's brother the FT-23. So it's no real surprise that it performs very very nicely. The output spectrum showed no spurious outputs that even came close to the spec'd "*greater than 60 dB down*". Power out was off a bit from the stated 2.0 watts with readings of 1.8 watts at 440 MHz and 1.6 watts at 449 MHz. Low power out was a battery stingy 100 Milli-watts. During these tests the battery's terminal voltage was 7.85 VDC. The receiver faired better with a sensitivity of 0.22 uV for 20 dB of quieting. These tests were run the same way and with the same equipment as the tests run on the FT23.

Add-Ons

The most notable add-on is the FTT-4 DTMF pad. This is a unit that appears to slip on but doesn't. This sounds a bit strange but what YAESU has done is put the pad electronics in a small package that slides onto the battery contacts.

The DTMF pad itself hangs down over the battery. The only problem is that due to the number of connections to be made there is a connector that must be plugged in inside the radio. The manual covers this installation very well but it sure would have been nice to have it just slide on and off.

The next add-on is the FTS-12 tone squelch unit. This unit will allow both encode and encode/decode operation on the standard 37 tones. This installs by removing the battery plate from the bottom of the radio and pulling the


10-pin connector
22-kilohm, 1/8-watt resistor
FTS-12
Insulating adhesive tape
Battery spring plate
Double-sided adhesive tape
10-pin connector
22-kilohm, 1/8-watt resistor
FTS-12
FTT-4
Double-sided adhesive tape

Tone Freqcency (Hz)			
67.0	100.0	141.3	203.5
71.9	103.5	146.2	210.7
74.4	107.2	151.4	218.1
77.0	110.9	156.7	225.7
79.7	114.8	162.2	233.6
82.5	118.8	167.9	241.8
85.4	123.0	173.8	250.3
88.5	127.3	179.9	——
91.5	131.8	186.2	——
94.8	136.5	192.8	——

Fig. 3. The Sub-Audible encoder/decoder is attached to the double sided tape as shown. Be sure and keep that 22 KOhm resistor for later reinstalation. The table shows the frequencies that the encoder/decoder will generate/recognize.

small connector out a bit. There is a 22 KOhm resistor inserted between pins 3 and 5 this is removed (and saved for later re-insertion if the tone board is removed. The tone board is plugged in and a piece of double sided sticky tape is used to hold it to an IC in the radio. The last step is to replace the battery plate. The nice thing about this encoder is that when you program it you use the tone frequency direct, no lookup tables are required.

Extra Goodies...

As with the FT-727 YAESU has primarily 3 different nicad battery packs. In this case one is the FNB-9 , the FNB-10, and the FNB-11. These are respectively a 7.2 volt 200 MaH, a 7.2 volt 600 MaH, and a 12 volt 600 MaH battery packs. Each on of these packs has it's own special wall charger and YAESU cautions against using a charger with other than it's on model battery. There is a five-hour quick charger, the NC-28B/C, which will charge all of the nicads at their proper rates. In addition there are 2 packs that are designed for use with dry cell batteries. Again as with the FT-727 there is a speaker-mike, the MH-12A2B, which allows the radio to become a belt radio or a mobile radio at the drop of a hat. Besides having the usual connections into the radio there is a connector on top of the plug that allows an earphone or speaker to be plugged in. This is the most versatile speaker-mike on the market at the present.

Overall Feeling

These two little radios are going to cause the competition a lot of headaches. They are both solid in both an operational and a mechanical sense. The overall battery life is quite good and comes from the battery saver circuit and the "full power" type battery. In other words when the radio was made miniature they shrank all of the parts except the *capacity* of the battery. Take a good look at these radios if you're in the market for a single band teeny-tiny handi-talkie.

Steve Hanselman, KC4SW
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By Robert S. Hoover, KA6HZF

The California Earthquake

A comprehensive look into the status of Amateur Radio for emergency communications. Are we Ready? NO!

As our understanding of plate tectonics matured it became apparent that large damaging earthquakes are a natural, periodic geophysical phenomenon at some points along the boundries of those plates. Southern California is one of the few plate junctions on the planet which is densely populated.

Following the eruption of Mount St. Helens, the occurrence of which was accurately predicted but the effects of which were grossly underestimated, President Carter asked the National Security Council to examine the implications of other catastrophic *natural* disasters. The NSC convened an *ad hoc* committee to study the consequences of a large damaging earthquake in Southern California. In November of 1980 the committee reported the following:

"...the Nation is ***essentially unprepared*** for the catastrophic earthquake (with a probabilty greater than 50%) that ***must*** be expected in California in the ***next three decades.*** While current response plans and preparedness measures may be adequate for moderate earthquakes, Federal, State, and local officials agree that preparations are ***woefully inadequate*** to cope with the damage and casualties from a catastrophic earthquake, and with the ***disruptions in communications,*** social fabric, and governmental structure that may follow. Because of the large concentrations of population and industry, the impacts of such an earthquake ***would surpass those of any natural disaster thus far experienced by the Nation.*** Indeed, the United States has not suffered any disaster of this magnitude on its own territory since the *Civil War.*"

The added emphasis is mine, the words are from the committee`s report, published by the Federal Emergency Management Agency in January of 1981. You can get a copy from FEMA (Washington, D.C. 20472) or by asking your Congressman; the report is numbered "M & R - 2".

Want me to run it by you again? California is going to have a catastrophic earthquake within the next 30 years; quite possibly before the turn of the century. It`s going to be the worst disaster to ever befall the Nation. This isn`t a joke or an April Special, this is fact. The earthquake is as inevitable as it is unavoidable, a natural geophysical phenomenon we can neither prevent nor avoid.

Having no experience with great earthquakes, most organizations have done little to prepare for them; the last big one to hit California was at San Francisco, in 1906. And of all the organizations expected to respond when the earthquake occurs, Amateur Radio is perhaps the *least well prepared.*

Is it Really That Bad?

Actually, it`s much worse. The report is six years old. The population and the density of population have both climbed since then. Local governments have allowed hundreds of of homes to be built in areas of high earthquake risk. And the problem grows more serious each year.

Many people -- perhaps a majority -- tend to discount the danger of earthquakes because we`ve had them before and come through okay. This attitude is quite common, even in some emergency response organizations, and it`s as dangerous as it is inaccurate.

A Richter 7 is only a little bit worse than a Richter 6, right? Wrong. One number on the Richter Magnitude Scale represents a ***32-fold*** increase in the strength (amount of energy released) of the earthquake. A 6 is 32 times as powerful as a 5, an 8 is more than **30,000** times as bad! (32^3 = 32,768)

You can divide all earthquakes into three broad catagories; Minor, Major, and *Great*; a great earthquake has a Richter Magnitude of 7.5 or more (some people say 8.0 or more). In 1971 a major earthquake struck the San Fernando Valley near the town of Sylmar. It destroyed a newly constructed Veterans Administration hospital, damaged another hospital near by (which had to be torn down), and toppled many commercial buildings. Sixty-eight people died and thousands were forced to evacuate their homes.

In 1976 a great earthquake struck the city of Tangshan, China. It leveled the city, killing approximately a quarter of a million people when most of the buildings collapsed. We *think* our buildings are stronger.

The great earthquake predicted to strike Southern California will be almost a thousand times as damaging as the San Fernando quake, even stronger than the Tangshan event, and its epicenter will be scant miles from the most densely populated region of Southern California.

Damage We Can Expect

Southern California gets 90% of its water from some place else. The earthquake will rupture the aquaducts and damage the distribution systems. It`s expected at least one local dam will fail.

In addition to water, all of our other life-line resources -- electrical power, gaseous and liquid fuels in pipelines -- will be severed or automatically shut down. It`s expected that all major highways and rail lines will be severed or blocked. The quake is going to knock out most of our telecommunications including data links vital to commerce, banking and government.

Estimates of dead and injured vary according to the time of the event. They range from 3,000 to 60,000 dead with hundreds of thousands of injured. Hospitals -- those which survive the event -- can`t begin to deal with the flood of casualties. Many of the injured will die needlessly for want of simple First Aid, from shock and dehydration.

The earthquake will stagger our Nation`s economy. Estimates of first-instance property losses, secondary property damage, and business losses run into the *hundreds of **billions*** of dollars. Many industries -- even some located in other parts of the nation -- will never recover from the great earthquake due to loss of market, disruption of the transportation system, or the shut-down of the banking industry.

Southern California isn`t just Malibu and a couple of movie studios; besides entertainment and communications Southern California is a major player in aerospace, electronics, computers and man other fields. Some companies located here are the *only* source of materiel absolutely essential to our national defense. We`re not talking pumpkins here, we`re talking about the whole pie.

Los Angeles is a major hub of transportation, banking, and communications, its loss for any period of time will have an immediate and devastating impact on the economy of the western United States, which will quickly be felt all across the country.

Island California

Geographically Southern California is remote from the rest of the country, an island linked to the nation with fragile strands of rail and road. Nearly sixteen million Americans are enclosed by a desert barrier that stretches hundreds of miles to the east. To the north lies fifty miles of mountainous terrain and the ocean bars the west. Following the earthquake Southern California will be virtually isolated from the rest of the nation, required to fend for itself for up to two weeks. Two weeks without water, power or gas. Two weeks without the protection of firemen or police.

This will be the greatest natural disaster to ever strike our nation and it will go down in the history of Amateur Radio as our blackest hour because we were not prepared. For the first time in their distinguished history hams will have failed their trust and the world will wonder why.

Why Is Ham Radio Unprepared?

We`ve been preparing for the wrong disaster, that`s why. To compound the error we`ve been told to practice the wrong *kind* of communications.

We aren`t prepared for a

great earthquake simply because we`ve failed to prepare for the ***Maximum Credible Disaster***, a violation of the most basic rule in disaster planning.

Earthquakes are unique among natural disasters because they strike without warning; even tornados have their season and offer some precursors, but earthquakes give none that we`ve learned to recognize. In seconds they destroy roads, structures and communications. Then comes fire, with few firemen, falling water pressure and blocked streets. The area of damage can be extensive, the Anchorage earthquake affected about 110,000 square miles. Every part of Southern California will suffer some effects and because of our location, isolated on a lower 'corner' of the Nation, it will be several days before effective relief efforts begin to take hold. We`ll be on our own and we aren`t prepared for it.

Our Disaster Plan Is A Failure

A century of experience with limited-area, weather-related disasters has evolved a basic disaster response plan intended to meet any situation. But the standard plan, based largely on experience gained from disasters in other regions, makes many assumptions which simply don`t apply to great earthquakes.

The typical plan is site-specific, designed around a central headquarters housing the Disaster Management staff and their supporting communications system.These 'central site' plans *assume* there will be time *and the means* to notify Key Man personnel; to 'activate' the plan. They further assume outside assistance will be quick to respond; that they need only hold the fort for 72 hours -- three days-- by which time the disaster will be under control.

In spite of warnings dating back more than 15 years great earthquakes are simply too rare to have influenced our emergency planning. In a misapplication of "If it works, don`t fix it," most disaster plans have not been significantly revised since the 1950`s; they are out of date demographically as well as organizationally. In some, earthquakes aren`t even mentioned.

Central Site plans are unsuitable for dealing with *wide area, catastrophic events*. A large damaging earthquake makes an instant shambles of central-site planning. There`s no time to activate the plan, key personnel are scattered, isolated by damage to the roads. Great earthquakes demand a change in our strategic planning.

A Plan That Works

If we`re to be ready for the predicted great earthquake we must adopt an 'all-hazard' plan, one which begins with the *maximum credible disaster* and works downward to include all possible hazards. Such plans are often called 'Multiple Site' plans to distinguish them from the older Central Site plans, which they often include as a sub-set.

In Southern California we must design our plan around the local schools; tactically we`ve no other choice. Schools are within areas of maximum residential population and usually some distance from secondary hazards as are found in industrial areas or near high-rise structures. Most local residents, even those without children, usually know the location of the schools in their neighborhoods. From the standpoint of tactical operations schools are ideal. California schools are highly earthquake resistant as a result of the Field Act, passed after the Long Beach earthquake of 1933. The open areas near most schools provide space for helipads, antenna arrays and temporary interment.

On an annual basis, there`s about a fourteen percent chance the schools will be occupied when the earthquake strikes and it`s most likely we`ll be unable to staff our communications points until our personnel know their children are safe. The schools are central elements in the fabric of any community and logic dictates we include them in our planning from the outset.

Multiple Site planning designed around local schools is particularly well suited for getting our communications and emergency response functions into action quickly. By pre-positioning communications equipment on a year-round basis at each school and structuring our communications network using a 'logic tree' or cellular array, our communication network needs only to be turned on to become active; log-in is automatic. In a cellular array the network simply expands or contracts as needed; call signs are assigned to the *equipment*, not the location. Missing or open cells in such a structure do not degrade the system. Indeed, their absence offers a passive means of determining the extent of damage.

Such a system is said to be 'Event Triggered'. When the earthquake strikes the basic rule is for communicators to report to ***the nearest school***. Your location at the time of occurance is no longer critical; at home, in transit, or at work the same basic rule applies. This rule also applies to Key Man personnel as well; they need only find the nearest school to become a functioning part of the Disaster Management team; so long as they can communicate, they can fulfill their role.

This illustrates a point overlooked in most existing plans -- it isn`t the *building* which is necessary to the relief effort but the *people*. A comprehensive disaster plan must be designed around the decision makers, not around the building housing them, just as the communication network must be designed with a cellular structure in order to accommodate a scattered command structure. This calls for a high degree of modularity and fully portable, self-contained communications equipment. Our present plans do not have these features.

Our Communication Plan Is A Failure

Traditional disaster communications planning assumes exist-ing radio systems such as fire and police will remain functional and in place but will be overloaded by the disaster. Hams are counted on to provide the extra capacity.

Limited local failures of the telephone system are anticipated and amateurs are expected to replace vital telephones with radio links.

Communications unique to the disaster such as coordination between Mass Care Shelters also falls to ham radio. Health and Welfare traffic, part of the Red Cross Disaster Welfare Information System during a disaster, is a traditional role for Amateur Radio and makes up the bulk of traffic following any disaster.

This neat summary becomes fiction when edited by an earthquake.

To assume ***any*** form of communication -- radio or telephone -- will survive a great earthquake is dangerous. Modern public safety communications uses repeaters, just as we do; our repeaters often share the same sites. But before any repeater -- amateur or public -- is included in the planning it should be hardened to withstand the anticipated ground shaking and be completely self-contained with an unreplenished endurance of ten days.

There will be an overwhelming demand for communications and communicators following the great earthquake, a need greater than we can fill even if every ham is pressed into service. To use a licensed Amateur Radio operator and his/her equipment as a telephone is ludicrous; it doesn`t take a license to key a mike.

Existing disaster communications plans and the sterile little drills they spawn are largely comprised of *'Ham as Telephone'* roles. This sort of 'training' has no value. Many critical communications problems may be resolved with a simple fixed link between two points. We should see that suitable equipment is installed and make sure the local people know how to use it. When the earthquake strikes one of the first resources we`ll run out of is hams. To have one standing around pretending he`s a telephone can cost lives instead of saving them.

One of the most valuable attributes of a Disaster Manager is a strong grasp on reality. Over the years the Amateur Radio community has lost touch with the realities of emergency communication, equating "public service" communication support to emergency preparedness. This false philosophy is a major reason the earthquake will find us unprepared.

Real-world Disaster Communications

Communication is the glue binding together the myriad elements of modern Disaster Management. A Disaster Manager doesn`t care who gives him the glue -- RACES, REACT, or a man off the street -- he only knows he needs it to save lives. Anyone who can cut the mustard will get the job and ***no one cares*** about licenses, Morse code, or your standing on the Honor Role.

There are three main roles for communicators in modern Disaster Management: Damage Assessment, Command/Control, and Health & Welfare. Most hams are only familiar with the latter.

Damage Assessment

Damage Assessment isn`t a traditional role for hams because most disasters, being of limited area and weather related are quickly assessed by professional, salaried personnel. Earthquakes are different. Following a large damaging earthquake there will be tens of thousands of damage incidents, from major failures of roads and bridges, to minor items such as fallen limbs. There won`t be enough trained, professional public safety personnel to go around; some damage assessment information *must* come from other sources.

Damage Assessment information is vital to the Disaster Manager because he has only a limited amount of resources to apply to the relief of the disaster and he must use them with the wisdom of Solomon. He will be trying to balance the short term tactical needs against the long term strategic goals, attempting to achieve the smallest loss of life while simultaneously facilitating the quickest possible recovery.

Without accurate and timely damage assessment information the Disaster Manager faces a deadly paradox; if there is a more critical need of which he is not aware, he may waste his resources and cause needless deaths. But waiting for better data can have the same result.

The Disaster Manager -- a collective title for a staff of experts -- must define the disaster area in terms of damage and hazards. To do so calls for large volumes of information gathered by every available means including guys on dirt-bikes and ultralight aircraft. Their information is used to determine the status of facilities, possible routes for evacuation or relief, the path of a fire... Before you can deal with a disaster you must understand the scope of it.

This calls for a fine degree of precision in the language used to define damage and hazards. Gross assessment, such as "The water`s over the road," is not precise enough; how *deep* over the road, and exactly where? Is it flowing? Which way? Is it rising? How fast? During a disaster there`s seldom enough time to coax specific details from a person unschooled in damage assessment.

Disaster Managers are impressed by the self-discipline and dedication of Amateur Radio operators and would like to use them for Damage Assessment when possible. But Damage Assessment is a physically demanding task that requires many skills besides communications. The bulk of Damage Assessment communication is via the ubiquitous HT which, as tuning to any repeater will prove, requires neither skill, dedication nor intelligence to operate. When the Disaster Manager is faced with the choice of training a young, physically robust volunteer who has never used an HT, or an elderly ham who has, there`s really no choice at all.

Command-Control Functions

The Disaster Manager must monitor the application of his rescue/relief resources (In Disaster Management a 'resource' may be anything from an idea to a bulldozer.); the resources may come from any source, from many different agencies, each having its own communication frequencies and procedures. To keep the information flowing to the decision makers requires a sophisticated system staffed by skilled communicators to link them all together. Often time you`ve no recourse but to cobble up something on the spot.

This is a job for Super Ham; No CB`er who has Bashed his way to an Advanced ticket need apply. The men and women needed to fill this role must have an abundance of common sense, cool heads and outstanding technical expertise. But each year there are fewer hams and these attributes are becoming rare.

Like Damage Assessment, Command-Control has its own language and procedures; there`s a long training curve and the already complex communication system is in a constant state of change. While I`ve no doubt the Amateur community can fulfill the role of Command-Control *tomorrow*, I`m equally positive we haven`t the personnel to insure the job will be covered ***for the next thirty years.***

Health & Welfare Traffic

Ham radio has always borne the brunt of Health & Welfare messages following a disaster but we aren`t prepared for the volume of traffic a great earthquake will produce. Our failure will contribute to, and may even cause, the virtual collapse of the Nation`s telephone system.

There are about fifteen million Americans in the area of hazard, about 9.2 million in the area of maximum risk, where we may expect loss of telephone communications. After the quake we can expect between 900,000 and 3.2 million pieces of ***outgoing*** H & W traffic.

Approximately 45 million Americans have family, friends or business interests in Southern California. In the first few days following the great earthquake they will generate between 9,000,000 and 15,000,000 pieces of ***incoming*** message traffic.

Would anyone like to hear the statistics of our performance with the 1964 Anchorage disaster? How about Sylmar? Or Mexico City? To say we did poorly is an act of kindness.

We simply aren`t prepared for it. Even the low estimate of *outgoing* traffic will completely swamp our present *non-emergency* capabilities. We are too slow and too poorly organized; we`re using the wrong procedures and obsolescent equipment. We`ve been deluding ourselves for years, equating "public service" with "emergency communications". And we`re about to be found out.

This isn`t a local problem, unique to Southern California. Outside of the disaster area the amount of traffic produced by the great earthquake will quickly overwhelm local nets and the National Traffic System. The failure of the NTS will ripple downhill and precipitate a crisis in the Nation`s telephone system.

When we are unable to respond to queries it will cause a kind of national paranoia. Lacking hard facts, rumors and fears will spread. People will generate *duplicate messages*, desperately hoping one will get through. And they`ll keep trying the telephone, despite all requests not to. They`ll call to see if there`s any word; they`ll call relatives and friends in other areas to see if *they`ve* heard anything... they`ll call their Congressman and the newspaper and they`ll call, and call... until they saturate the switching capacity of many cities, with disasterous effects.

What Price Failure?

We`ve got a good record as emergency communicators but we`ve never tested our steel against a great earthquake; Alaskan hams proved they have the Right Stuff but Anchorage is no more Los Angeles than Modesto is New York City. (At any given hour the number of

Southern Californians on the *freeways* usually exceeds the entire population of Alaska.)

For years we`ve been eating out on our reputation, like a high-priced baseball player lionized for hitting a lot of home runs. But at his salary he`s ***supposed*** to hit homers. And as licensed members of the Amateur Radio ***Service*** we`re *supposed* to provide emergency communications.

When was the last time you read the regulations? You and the government have entered into a contract: The government grants you various privileges in return for your promise to provide emergency communictions should the need arise; it`s the only form of ***communications*** specifically mentioned in the preamble of the regulations. The rest of it -- International Goodwill, Advancing the Radio Arts, and so on -- is all hog wash, undefinable and unenforceable.

It comes as a shock to many hams to discover Amateur Radio isn`t a hobby but a Federally licensed Service. We`re allowed to use commercially valuable portions of the spectrum because we`ve agreed to provide a needed service during a disaster. TNSTAAFL -- There`s No Such Thing As A Free Lunch -- We`ve had our fun playing radio but now it`s time to foot the bill. And we`re tapped out, a bunch of aging appliance operators who are about to flush ham radio down the porcelain fixture.

It`s SHOWTIME, Folks!

The predicted earthquake is going to hit, you can take that to the bank. And it`s going to find ham radio unprepared. Now; what do we do? Shrug our shoulders? Tell them we did our best; that it`s not our fault? That nobody told us it would be this bad? Promise to do better ***next time?***?

That`s not going to work, not with thousands of Americans dead in the rubble. Following the earthquake there will be ***years*** of hearings, trying to find fault and assign blame. This sort of public shrivening is a peculiarly American phenomenon; the Shuttle Disaster is one example of it, the Kennedy Assassinations another. I`m not saying if it's good or bad, I`m saying *that`s what`s going to happen.* And for Amateur Radio there won`t be any *next time.*

With a couple of dozen agencies on stage and a chorus line of insurance salesmen singing the blues, and all those Disaster Managers chanting "It`s Not My Fault!", America is in for a real extravaganza.

"But, It`s Not MY Fault!"

Without communications you have disaster but with it you get *Disaster Management*; the ability to respond by design instead of default. Every failure of Disaster Management may be said to be a failure of communications, and every Disaster Manager is going to do his best to make that point loudly and often.

After the California Earthquake, disasters are going to become very popular with the politicians, they will become experts on every facet of the subject literally overnight; their staffs will insist on it, if not the people who put them in office. And when the correlation between Disaster Managment and Communications is understood, the spotlight will swing our way; Amateur Radio will be on center stage.

Our past record won`t help; in show biz you`re only as good as your last performance. They will pick apart our failures one by one and every black mark will cost us spectrum -- again, the Disaster Managers will see to that; they`ve lusted after our frequencies for years. After the earthquake we`ll be lucky if they let us play a little CW on the CB bands.

The Same Old Song

I`ve been hoeing this row since 1981. Hundreds of people have either heard me speak, downloaded this article from bulletin boards or saw the material in hand-outs at various earthquake preparedness conferences. But you`ve never seen it in a ham radio publication until now; they all rejected it.

Having painted a grim picture of the future I usually find myself speaking to a smaller group than when I began, and it`s a *younger* group, too. Someone usually asks if our fate is really that certain; if there isn`t *something* that we can do to change things.

There are a lot of things we can do but the outlook isn`t very hopeful. Besides problems of administration, organization and funding, we really don`t have enough hams to deal with the predicted earthquake.

Many argue with this because the earthquake is going to occur in California which has more hams than any other state in the Nation. But numbers alone don`t tell the story. Southern California attracts alot of retirees and that includes hams. The average age of hams in this region is nearly sixty, almost twice the median age for Southern Californians. Disasters have a nasty habit of killing kids and old people. The typical Southern California ham qualifies as Old People; they`re far more likely to be a casualty of the great earthquake than a factor in its relief.

Practical Preparedness

I`ve already mentioned some things that could alter the situation, such as the need for a different disaster plan. But there`s one thing we can do which will *eventually* solve the other problems as well; we can make ourselves ***younger***.

Great Earthquake as a Fountain of Youth! Crazy, eh? Now follow me through:

In the absence of any structured, organized program to recruit new hams the typical ham, having a perfectly normal desire to share his enjoyment of ham radio, recruits his friends; people he knows. Over the years the average age of American hams has crept upward, as has the age of new licensees. It`s a natural trend but a deadly one for ham radio.

There can be only one result of such an inept system; the eventual evaporation of ham radio from the American scene. One day the last ham in America, a ninety-six year old nursing home resident, will recruit the 92 year old kid in the next bed... and they`ll both die trying to get down to the rec hall to play with the radio.

The only way to reduce our average age is to bring in a lot of younger people. And to ***keep*** bringing them in, year after year. Amateur radio must be ***nurtured***; a major portion of our effort -- or the efforts of our so-called leaders -- must be devoted to this one problem on a permanent basis. We must climb down from our ivory tower and accept the fact that if Amateur Radio is ***to survive*** it must be willing to actively compete against a wide variety of other interests in order to attract, recruit, and retain new hams. And it must compete successfully. This calls for innovative methods of recruitment and training as well as a complete change of attitude by the stewards who presently serve us so poorly. The answer won`t be found in any comic book nor a museum filled with relics of a Golden Age. The answer will only come from you.

The obvious place to find young recruits is the schools and our equally obvious ally in their recruitment is their parents and school adminstrators. The threat of a catastrophic natural disaster is appreciated more keenly in our schools than in any other segment of our society. We must form a permanent working partnership with our Nation`s schools, giving them the safety our communications resources can provide, extracting from them a corps of younger hams.

Going to the schools for hams offers a tremendous advantage in our emergency preparedness posture. If a school has hams we can make sure it also has a station suitable for emergency service, the infrastructure of a distributed communications network. Such a system is also self perpetuating after about the sixth year. With the cooperation of the school district it`s possible to utilize hams recruited in primary school and now attending high schools to serve as mentors for ham radio programs at middle and primary schools, with administration shared by the school district and the local Amateur Radio community. In some cases these activities may be extended to local two-year colleges on a "For Credit" basis with the credits applicable to a wide range of subjects.

I outlined such a proposal in 1984 and found educators and parents to be generally receptive. The only people who thought the idea had no merit were certain officals of the local Amateur Radio community, all staunch advocates of the ARRL non-plan. One official displayed his wit, humor and intelligence on the local two-meter repeater with numerous sallies about using five year olds for emergency communications. And while this particular Extra Class, Life Member of the ARRL was the only visible opponent, the fact remains the plan died a lonely and silent death, the victim of tacit condemnation.

A large number of younger hams in and of itself would forever determine the future direction and structure of Amateur Radio. For this reason alone most older hams, while giving lip service to recruiting goals, do little to actively support such programs. In many causes they work diligently to thwart such programs.

Yet this is our future, our *only* future. Our Fountain of Youth. Either we dedicate our system to bringing them into the fold in a regular, orderly stream, or we admit our own hypocracy and watch from the sidelines as Amateur Radio staggers through its death throes.

Modern Disaster Communications Equipment

Field Day, 1985, is approaching as I write these notes. People are trying to remember who saw the generator last and hoping to find enough CW ops to man a station.

Originally intended as an exercise in emergency communications, Field Day has degenerated into a combination social event and contest, its spirit and purpose prostituted. With a year to prepare and the date and site known well in advance, many stations still fail to get on the air, blaming their lack of preparedness on "Murphy" in an orgy of self pity, always promising to do better "next year".

When an earthquake strikes Murphy not only reigns, he *rules*. You either have the right stuff or you don`t. And there`s no 'next year'.

To be even moderately well prepared for the predicted earthquake will require *hundreds* of man-portable, high-speed digital stations capable of being on the air within ***minutes*** following the quake. Each station should be able to handle one thousand pieces of message traffic per hour and operate unreplenished for a minimum of ten days.

Star Wars? Hardly! Everything needed for such a station is available off the shelf and can be powered by a lawn mower engine belted to an automotive alternator, periodically used to recharge a bank of four car batteries. The technique of batteries-plus-charger uses the minimum amount of fuel; you can keep a 30 watt station on the air for as little as a gallon of gas a day.

Thirty watts causes many hams to shake their heads. Traditional emergency communication plans are usually designed around high powered stations, either stationary or mounted in expensive 'bread-truck' commun-ication vans. Emergency comm-unicators often rate their effic-iency on transmitter power alone, a disturbing offshoot of the Field Day/contest syndrome. Through-put, accuracy, modu-larity and portability are alien to the vocabulary of the "trad-itional" emergency communica-tor, their baisc tool is power.

The basic tool for dealing with a catastrophic disaster is ***information.*** Modern Disaster management is driven by huge amounts of information, quantities that can only be provided by ***high capacity*** networks, rather than high power. Digital systems such as packet radio are needed to collect and transmit the large volume of data from many points to the decision makers. High power can be translated into a lack of mobility and increased fuel consumption.

Triage

Without a distributed network of high-speed digital stations the information tap is shut off; decisions are made by default. The decision making process, even under disaster conditions, is a complex, multi-faceted procedure that must consider many factors not directly related to the immediate relief of the disaster at hand, such as matters of National Defense and long term economic recovery. It may be demonstrated that with sufficient information such factors need not impact the immediate task of reducing the death toll and limiting the extent of the disaster. But it may also be shown that *without* sufficient information top-level decision makers must opt for the good of the Nation first and the welfare of the individual second; this situation need not arise if we are adequately prepared.

One Last Chore For Ham Radio

Wherever hams gather, whenever the talk turns to emergency communications, you`ll hear the romantic story of a young wireless wizard who saved his town using a one-tube transmitter made right on the spot from an Atwater-Kent.

And though we may have heard the story a thousand times, we still listen politely, enjoying a secret warmth knowing we are a part of the Legend.

Tough Darts, fellers. A great earthquake is about as romantic as a hand grenade in your shorts.

Modern-day Disaster Management requires the capture, manipulation, communication, and display of vast quantities of data. Many relief functions are highly automated and must be spoken to in a specific format and syntax to trigger the proper response.

A large part of realistic disaster preparedness involves learning the necessary language and procedures to communicate effectively with more than two dozen emergency response agencies having wildly diverse communication systems. This complex structure has evolved over many years but a majority of hams are not aware of it. We, the Communicators of Last Resort, have failed to keep up to date in the one type of communications our Nation has asked us to perform.

In the modern world the stakes of Disaster Management are frighteningly high. If Southern California is not swiftly returned to its full productive capacity following the predicted earthquake the economy and possibly even the defense of our nation could be at risk.

A critical analysis reveals that much of this horrendous responsibility rests squarely on the shoulders of one key man: You. In the absence of an effective emergency preparedness program on the part of the ARRL, the responsibility falls to the individual Amateur Radio operators of the United States. The crucial question is: Are you a part of the problem? Or a factor in its solution.

Or are you one of those hams who casually ducks his responsibilities by saying you`ll be there ***if*** you`re needed?

No ifs' about it, Old Man -- you`re needed! But you`re needed ***now,*** before the event, while there`s still time to learn the system. The other sort -- hams who wander in after the earthquake, waving their ticket and grandly offering to "Help out" -- are about as welcome as a finger in the eye. Oh, you`ll be put to work, never fear. But if you don`t know the procedures and haven`t learned the system... what do you expect to be doing? This isn`t story time at the club; we're fresh out of Atwater-Kents. And it doesn`t matter if you`re 5BDXCC and can swat out 30 wpm, an unlicensed kid with a VIC-20 can handle fifty words *per second...* and pick his nose at the same time.

If you don`t know the language, if you don`t know the organization, you just don`t know enough to be very useful... Would you mind helping with the coffee?

Here's The Bottom Line

If you're under fifty you're going to see the big quake, the worst natural disaster to every strike our Nation. And no American will remain untouched by it. Your task as an Amateur Radio operator is to prepare your family and yourself to survive the event, and to make sure your equipment comes through unscathed. Then learn your role in the emergency communications plan and train yourself to do the very best job you can. And don't be afraid to ask questions; if your local plan sounds stupid or out of date, it probably is.

If you're over fifty your task is more demanding because you probably won't live to see the Big One. But your *legacy* could mean the survival of Amateur Radio.

Your task, if you're willing to accept it, is to see your skills and the essence of your experience passed safely into younger hands. The big problem here is how to accomplish such a thing. Many older hams give their *equipment* to their local group and feel they've done enough. Wrong. We can build or buy equipment, we can't do the same with people. We don't want your equipment, we want *you*, but you won't be here. Your task is to groom *your own replacement.*

If there's no active program to recruit youngsters in your area you'll have to find the kids yourself. Then *ask them for their help*. Explain that when you're gone the community will be less well protected; that we *need them.*

If you can catch, train, and license just *one* young ham you will have reached your goal.

And Finally...

Amateur Radio is facing the most critical test in its history, a trial imposed by a cataclysmic natural disaster. If we fail the test it may be the deathblow for ham radio, and for thousands of innocent victims.

Hams are always helping someone ***else.*** For almost seventy-five years we've given of ourselves at home and abroad, during desperate wars and periods of fragile peace. When help was needed, we were there, which makes this all the more ironic: If the great earthquake finds us unprepared it will mean the end of Amateur Radio as we know it. And history will record that the only group we ever ***failed*** to help, was ourselves.

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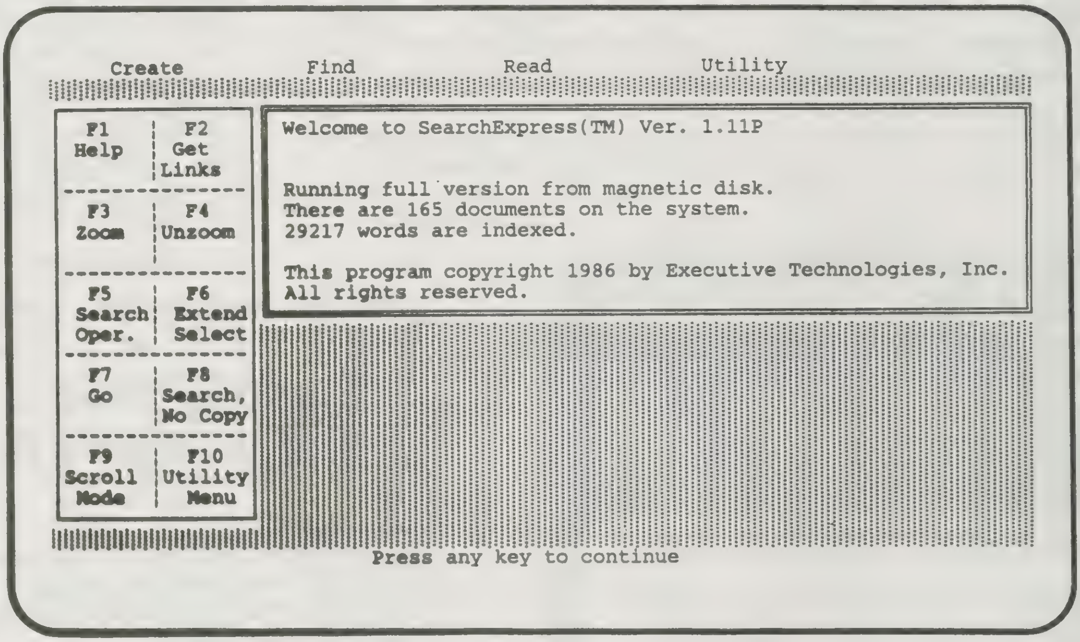

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By Jim Pittman, KA4PDZ

Computer Babble

The Beginners Guide to Computers

This article is about making the decision to get a computer for your business and being able to understand all the computer babble that the computer salesman will throw at you. The first thing to consider is how much are you willing to spend for a computer and how easy is this computer going to be to expand and service. The next thing to consider is how many places are there locally that can service the computer you bought and will they give good service without charging an arm and a leg. In buying a computer on today's market, where the prices are dropping as faster and better equipment becomes available on the market, you might consider leasing the computer instead of buying it. This option offers you the flexiblity to get everything that you want on your system, hardware and software, and a service contract can be included by most leasing companies in the cost of the lease. You would be able to have a computer for several years and when your business needs a better computer than what you have the leasing company can sell your system and you can choose a new system and continue to grow. The other nice thing about leasing is that the amount you pay in the lease can be written off on your taxes each year.

In purchasing a computer system, you need to learn a little about the terms used when working around a computer. To some of you that are reading this article some of this might seem a little bit boring, but there are people who need to know this information and have no idea where to find it. The first thing to understand is that computers have come a long way since the first ones. The first totally electronic digital computer went into service in 1946. It was called ENIAC and it took up 1,500 square feet of floor space, weighed over 30 tons, and contained over 18,000 vacuum tubes that failed at the rate of 1 every 7 minutes. Most companies that had systems like ENIAC in the ensuing years had to hire high school kids on roller skates to wheel around and replace the tubes as they burned. Computers got smaller when the vacuum tube was replaced by the transistor, and soon thereafter, by silicon chips. The development of large scale integration (putting huge amounts of data into microscopic spaces) also aided in the reduction of computer size. As computers became smaller, they also became faster. In the early days, processing time would be measured in seconds and milliseconds (thousandths of a second). Today, processing time is measured in microseconds (millionths of a second) and nanoseconds (billionths of a second). The Central Processing Unit (CPU) in the IBM PC (that was introduced in 1981) is four times faster than the IBM 360 (that was introduced in 1964) and about the size of the control monitor for the IBM 360. The Central Processing Unit has 2 parts:

1) The Control Unit know as the Computer's Brain and,

2) The Arithmetic/Logic Unit which is the Computer's Calculator (for handling binary numbers).

The Controll Unit does the following things. It accepts instructions, interprets the instructions, executes the instructions, controls the Arithmetic /Logic Unit, controls peripherals, and manipulates data throughout the system. The Arithmetic/Logic Unit is divided into three parts and they are the Accumulator, Adders, and Registers. The Accumulator retains partial computations until used and combines main and learned memory as needed. The Adders monitor and adds incoming and outgoing data (binary numbers). The Registers temporarily store data from main memory, and return it as it is no longer needed. Next I am going to discuss the Computer's internal transit system. This may seem like a lot of information to digest, but if you read this article about 10 times, according to the experts, you will be able to remember most of it.

All information that goes in and out of a computer passes through an input/output port (I/O Port). Early computers had only serial ports that received and returned data serially, or, one bit at a time. Processing time in computers was vastly improved by the development of parallel ports which handle and move large amounts of data simultaneously.

The process utilizes electrical conductors (printed circuit boards) that will carry multiple electrical impulses around the insides of the computer. These multiple impulse carriers are known as busses, and when several are used together, they are called bus systems.

Humans and computers think of memory in different ways. We think of it in terms of letters and pages. Computers (and computer people) deal with memory in terms of bits, bytes, K's, Megs, and Gigs. The comparison chart below should make it all a little easier to understand.

Computer	Humans
8 bits = 1 byte	Nothing comparable to bits
1 byte = 1 character	Any letter, number, symbol, or space.
1 K = 1,024 bytes	
1 page = 3,072 bytes or 3 K.	
1 Megabyte = 1 Million bytes	
1 Meg = approx. 333 pages	
1 Gigabyte = 1 Billion bytes	
1 Gig = approx. 450,000 pages	

There are three types of memory used in computers.

The first is called permanent memory. It is the computers main, working memory. It is also known as Read (sometimes also known as Random) Addressable (sometimes known as Access) Memory.

The second is long term memory which is simply storage. This is memory that may be stored outside the computer on tapes, floppy diskettes, or hard disks.

The third is learned memory also known as Software. This is memory that the computer uses temporarily to perform a specific task. The computer will not retain this data, but must "relearn" it each time you wish to use it.

In order to understand how your PC handles and stores data and information, you will need to understand files, records, and fields. Each diskette contains up to 64 files. A file is a collection of related records arranged in fields of data. Each file may have thousands of records. Records may have thousands of fields.

Files------>contain------	**Records**----->contain--->	**Fields**
The	Lambert	Age
Pittsburgh	Swann	Height
Steelers	Bradshaw	Weight

The Disk Operating System (DOS) is responsible for the overall operation of your PC. DOS has 3 main operational functions:

1) To interpret and execute your commands,

2) To manage and process disk files, and

3)To oversee and communicate with peripherals.

Before proceeding with specific commands, it will be helpful for you to understand a few terms and concepts. Fragmentation is a term used to describe a file that is "broke up" and resides on different parts of a diskette rather than intact in one place as it should be. The computer when it closes a file doesn't known if you will be opening the file again so it writes the next file right behind the one that you just closed. If you need to add to the first file, the computer then puts a flag at the end of the file and codes it such that it is tied to the addition elsewhere on the disk. There are two types of commands, internal and external. Internal commands are built into the command processor; and external commands reside on the DOS diskette.

Format b:/s

You must put DOS onto all new diskettes that you want to use with your disk driven PC. With third party software, you must format a blank diskette before you can copy anything onto it. To format a new diskette, first insert the DOS diskette. Type format b:/s and press the Enter (Return or Carriage Return) key. By using format b:/s you will format and transfer the three system files to the new diskette.

Chkdsk b:

This command will tell you:

1) how many total bytes of storage on the diskette,

2) how many bytes of storage that remain available,

3) the number of files,

4) total bytes of PC memory,

5) bytes of memory still available.

Diskcopy a: b:

This command will produce a "carbon copy" of the diskette in drive A to the diskette in drive B.

Diskcomp a: b:

This should be used after a diskcopy command. It will verify that the original was copied correctly.

Copy a:*.* b: (Internal)

This command is slower than the diskcopy command, but is useful because it copies all files sequentially and regroups any fragmented files. This command can also be used to copy a single file by file name. Please refer to your DOS manual.

Comp a:*.* b:

Compares the copied diskette to the original on a file by file (ie: name by name) basis.

Dir

Lists all filenames, the type of file and its extention (ie: .com, .bas, .exe, .bat, etc.), the size of the file in bytes, and also the date and time that the file was created or the last change was made.

This is the first part of this article and will be continued in the next issue.

Jim Pittman, KA4PDZ
Care of **CTM**

By Steve Hanselman, KC4SW

Yaesu's
FT-727R
A Review of the Dual Bander
144 MHz & 440 MHz

Well with some luck this month we'll be floating in YAESU radios. Chet just phoned and said that the new mini handhelds are on the way, and I've already got the "dualband handi". So I'd better get on the road with the FT-727R review.

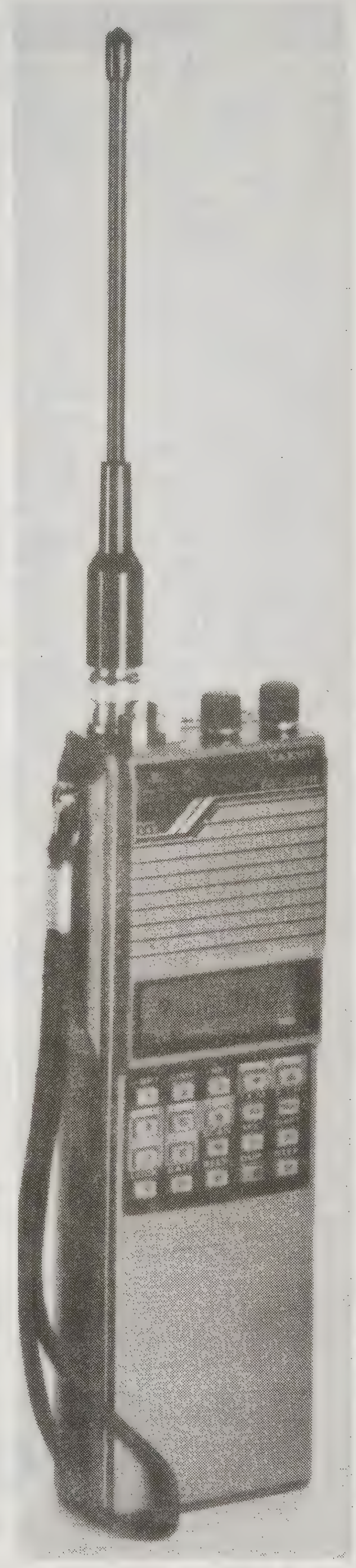
As some of you know awhile back we looked at the dual-band mobiles that were on the market and were amazed at the amount of radio that could be packed into a very small place. Typically 25 watts on TWO bands in one small package. Well the end is not yet in sight, YAESU has brought out another duo-bander except that this time it's a handheld. This unit is rated at 5 watts on both bands and is just a bit larger than the average single band handi talkie. When the unit arrived here in the shack, it came with all sorts of very nice accessories, there's almost enough of them for their own review.

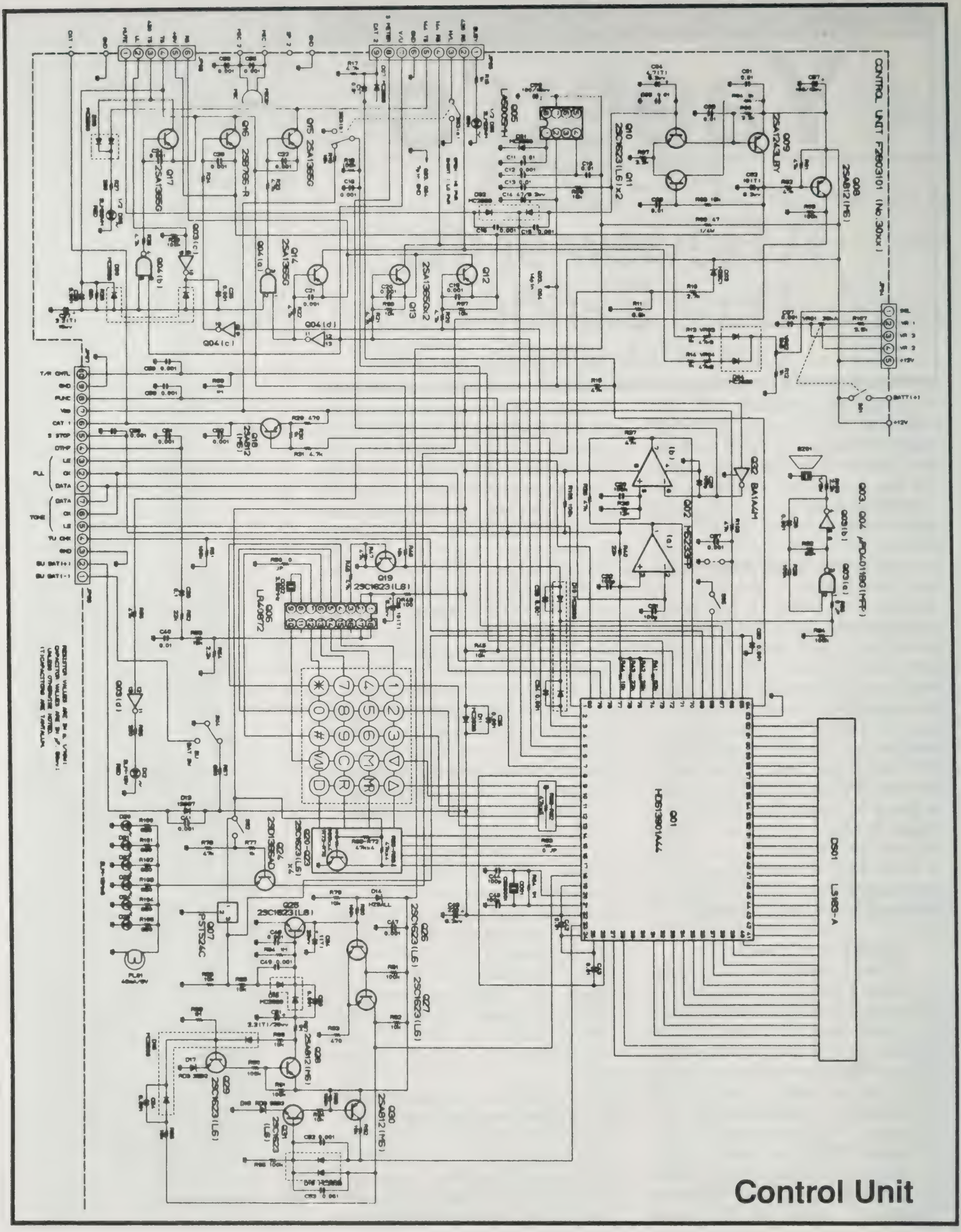
Operation of the Radio

When I went to try and operate the radio I quickly found out that this is one radio you need to read the book first. There are 20 buttons on the front of the radio and a **"function"** button on the side. So in reality there are 40 pushbuttons to learn how to use. True some of these are the standard 16 button DTMF pad, but it's still a bit creative. First there are 2 modes of operation either **"dial"** mode or **"memory"** mode. In dial mode the receiving frequency is entered on the keypad and the **"D"** button pushed. Now we need to check the display to see if one of the blocks labeled **"+rpt"** or **"-rpt"** is on, if they are the transmit frequency will be either +/- 600 Khz on 2 meters or +/- 5 Mhz on 450. When neither of these are on, then you're in simplex mode. By the way, if you make a mistake there's a **"C"** button that wipe out the last entry and sets you back to where you started.

To memorize a frequency you just push **"M"** and the channel number to store it in and thats it. The first 4 memories allow the storage of both transmit and receive frequencies for non-standard splits. As you can see, the operation is somewhat complex and has prompted one of the local hams (Hop Hayes, K4TQR) who has one of the radios to complain of "needing a degree in computer programming" just to get it set up. There are still another 20 buttons to go so we'll hit the high points. The **"step rate"** between channels is set for each band with the **"STEP"** button, choices are either 5/10 Khz on 2 meters or 12.5/25 Khz on 450.

To scan the memories all you do is enter memory mode **"MR"** then hit the **"SCAN"** button, next push the **"UP"** or **"DOWN"** arrows and it's off and running. If you decide that you don't need to look at all of those frequencies,


FT-727R 144 Mhz 440 MHz



Control Unit

you can clear them by selecting the channel to clear and then hitting the **"MC"** button. There are several other normal type buttons, one for listening on the transmit frequency, and another for turning the beep on and off, last but not least is the dial lock button.

There are two very different buttons left on the radio. One of these sets the display in the battery monitor mode. When this is energized the display shows the charge state of the battery. While in this mode, the radio will operate on the channel you were last on, but you cannot change to another channel. The other button is the **"DUP"** this allows to use the radio cross band. When this is selected the radio *receives* on the band that is displayed and *transmits* on the other. Reverse operation is possible by just hitting the "V/U" (VHF & UHF) button.

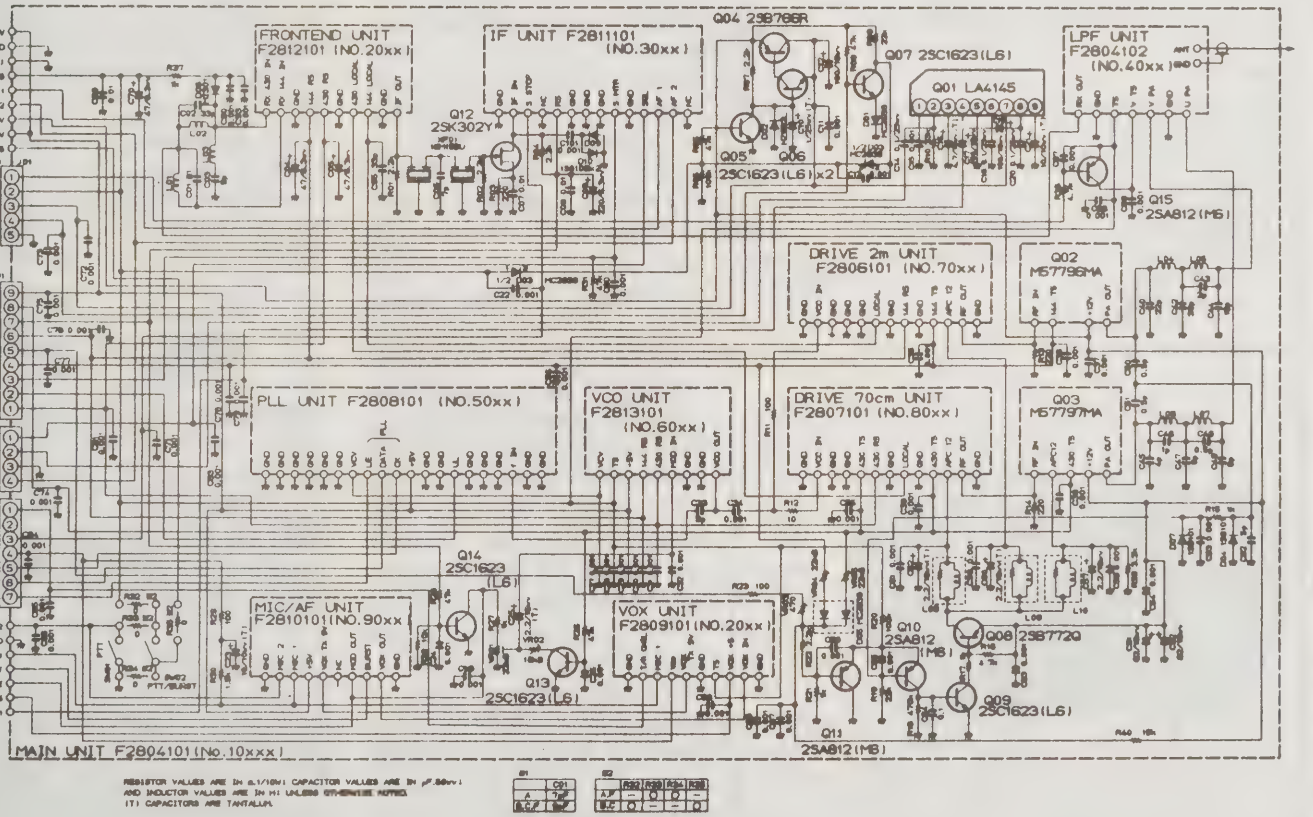
Performance

Performance on this radio is just as great as the features it has installed. We checked the sensitivity on a H-P 608C signal generator and found that it ran .15uV from 144 to 148 and .15uV at 440 to .12uV at 450, for 20 dB quieting. Power output is rated at 5 watts both bands, we measured 4.4 at 144 to 5.0 at 148 and 4.2 at 440 to 4.8 at 450. My meter, which is a BIRD termaline, seems a bit stingy so the results are probably a bit higher. Talking to several folks over in the Atlanta area indicated outputs as high as 5.5 watts across both bands. Looking at the output spectrum on a TEKTRONIX model 1401 we found that the transmitter was extremely clean meeting the down 60 dB spec neatly. One interesting point is that using a "radiated signal" type of pickup, we could look at the local oscillator and then when we went to transmit the output was absolutely clean.

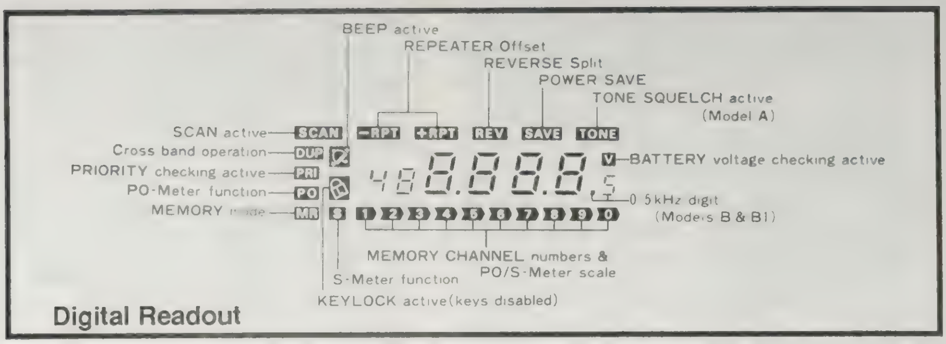
Accessories

As we said earlier YAESU sent us about every accessory for this box available. There are 2 basic nicad packs for the 727 one the FNB-3A is a low voltage pack, power output is lower but radio operation is longer on this pack. The other is the standard FNB- 4A which is a 12 volt .5 amp battery and will support the radio at it's rated output. There is a 117vac wall plug type charger for each of these batteries. They will fully charge the battery in 14 hours. ***They are different***, so be sure and use the correct one. The base charger, NC-15 that is available for the FT-727 is both a rapid charger and a base station power supply for the radio. The base charger will also charge each of the battery packs. There is one more pack available, the FNB-5A, this pack allows the use of "AA" batteries with the radio. A 12 volt mobile adapter/charger is also available, which plugs into the bottom of the battery and will charge and run the radio. Be careful when using a non-YAESU adapter on the bottom of the radio because while the connector is standard, *the polarity is negative (-) on the center pin.*

The CTCSS (subaudible) tone module is shipped in an antistatic


FRONTEND UNIT F2812101 (NO.20xx)
IF UNIT F2811101 (NO.30xx)
Q04 2SB766R
Q07 2SC1623(L6)
Q01 LA4145
LPF UNIT F2804102 (NO.40xx)
Q12 2SK302Y
Q05 Q06 2SC1623(L6)×2
Q15 2SA812(M6)
DRIVE 2m UNIT F2806101 (NO.70xx)
Q02 M57796MA
PLL UNIT F2808101 (NO.50xx)
VCO UNIT F2813101 (NO.60xx)
DRIVE 70cm UNIT F2807101 (NO.80xx)
Q03 M57797MA
Q14 2SC1623 (L6)
MIC/AF UNIT F2810101 (NO.90xx)
VOX UNIT F2809101 (NO.20xx)
Q13 2SC1623(L6)
Q10 2SA812 (M6)
Q08 2SB772Q
Q09 2SC1623(L6)
Q11 2SA812(M6)
MAIN UNIT F2804101 (No.10xxx)

Main Unit



Digital Readout

bag and is fairly easy to install. It is placed in the bottom of the radio in a compartment between the battery and the radio itself. Be careful when putting it in, as it is a fairly tight fit. The CTCSS module supports both encode and decode functions and is front panel programable to all of the standard EIA tones. The nice thing here is that there is no tone "code" to memorize, the front panel reads the frequency directly in hertz. There is a headset available and the radio supports VOX when using it. We didn't get to look at this but the folks here in Birmingham that have the 727 all have the headset and really like it.

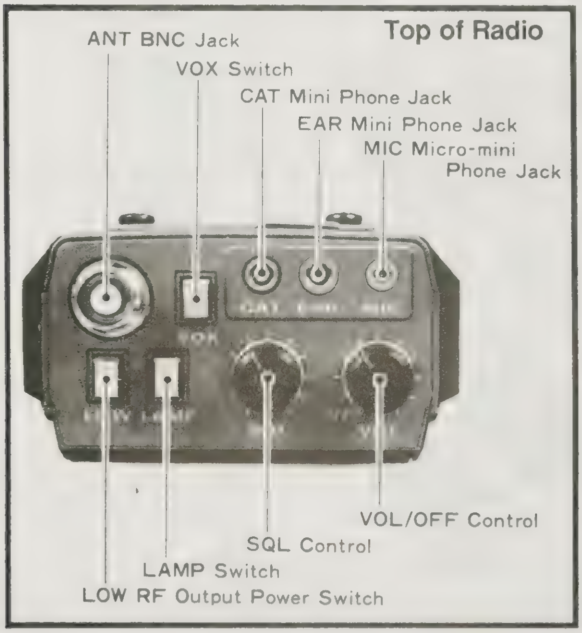
Lastly is the speaker/mic and this is the best one around. Not only does it operate as a speaker/mic, but, on the part of the cable that plugs into the radio, there is another sub-miniature socket. This allows you to use an earphone in a noisy enviroment or, like I did, plug a mobile speaker in and **"pooof"** and instant mobile radio.

Conculsion

Overall, this is the best handheld radio I've had my hand on. There was very little problem when operating the radio on our RF saturated hilltop. It has one of the hottest receivers I've seen. Don't make the same mistake I did when I first got it. I was tuning across the 2 meter band and found several signals that looked like the receiver was hearing itself. A quick check with other hams in the area showed that they had not had this problem. Further checking in the shack and later outside showed that the radio was hearing the leakage from the cable TV we have in the house. This is the only radio I've had that would hear these signals, and this is very impressive. Hop and I are looking at the possibility of using the 727 as a part of a remote base. There is an input on the top of the radio that is labeled CAT. This stands for computer access and allows you to program the radio by what seems to be 4800 baud serial data port. (I sure wish Yaesu had sent us one to review or at least sent us more information on this feature.) In addition there is an output for signal strength from this port. There is not a lot of information about this in the manual.

Definitely check this radio out when you go looking for a new handheld or multi-use radio. Again there are a lot of features packed in this handheld, be sure to check out the manual.

Top of Radio



Steve Hanselman, KC4SW
8021 8th Ave. North
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Part 3 By Robert S. Hoover, KA6HZF

The Portable Pakratt™

Converting the C-64

Disclaimer

Neither the publisher of this magazine nor the author is responsible for any damage that might occur if you attempt this project. You do so at your own risk.

This Is Revision 'D'

If you are reading this in **CTM** Magazine you are seeing revision D, as of December 1986. There are several versions of the C-64 circuit board, which may be broadly divided into two types, both of which are covered in this revision.

I have not yet converted a C-64c, the most recent version (GEOS in ROM). Anyone having a C-64c who is interested in doing the conversion is invited to contact me directly.

Thanks to Chet Lambert and **CTM,** Rev. D gives you the benefit of better illustrations than those provided with either the original manual or the version given to Mr. Don Root of the California Office of Emergency Services (RACES) for distribution.

No 9vac When On Battery Power

The 12vdc conversion of the C-64 was intended to be used only with the AEA PK-64 'Pakratt'™, which does not require the User Port. Consequently, I made no provision to provide 9vac power to the User Port when operating from the battery. If you are using an RS-232 interface which uses the 9vac buss, it will not work on battery power.

The obvious solution is to use an RS-232 adaptor which does not require the 9vac line. The Mid-Tek **DATA-20** is one such device, available for $15.00 from Mid-Tek Electronics, POB 489, Harlan, Indiana 46743 tel (219) 657-5680. (see separate article on **DATA-20** this issue, Ed.)

Original Switches No Longer Available

While preparing this material for publication in **CTM,** a gentleman doing the conversion from the original manual informed me the 4PDT in-line switch I`ve called out is no longer available. However, he also reported he was able to substitute a similar switch with no problems.

This was bound to happen eventually. It`s been more than a year since I did the original conversion and the switch was a new-surplus item to begin with. Fortunately, it isn`t a serious problem. I have some of the switches and I`ll send you a pair (the 1541 uses the same switch) for $5. However, since this was never intended to be a commercial venture, and as I`ve only got a few of the switches, see below.

All-Electronics has a pair of 4PDT switches that appear to be suitable, mounted in a frame with three DPDT switches, all for $2.50 (CAT# NAISW-15, shown on page 14 of their FALL/WINTER 1986 catalog (blue cover)). You can probably use this switch after removing it from its mounting frame (just bend back the tabs on the frame). I say 'probably' because I haven`t had my hands on the NAISW-15 but the only difference I can see is that mine has eyelets on the top of the switch and PCB pins on the bottom (eyelets are easier to solder to). NAISW-15 has PCB pins both top and bottom.

All-Electronics has a $10 minimum, and since they also carry other parts you`ll need in the conversion, I suggest you get their catalog (call them; 1-800-826-5432 In California; 1-800-258-6666)

"Don`t Panic!"

-- Douglas Adams

To judge from the question most often asked, most people worry that the conversion will somehow damage their computer. It doesn`t work like that; the conversion simply re-routes a couple of circuits through a switch you install, it doesn`t materially change either the voltage or current those circuits are handling.

Nor should you worry that something **you** do while installing the conversion will destroy the computer. You really have to screw things up bad before you`ll hurt your C-64 and I hope you`ll have the sense to stop before then. It`s a good idea to stop anytime you

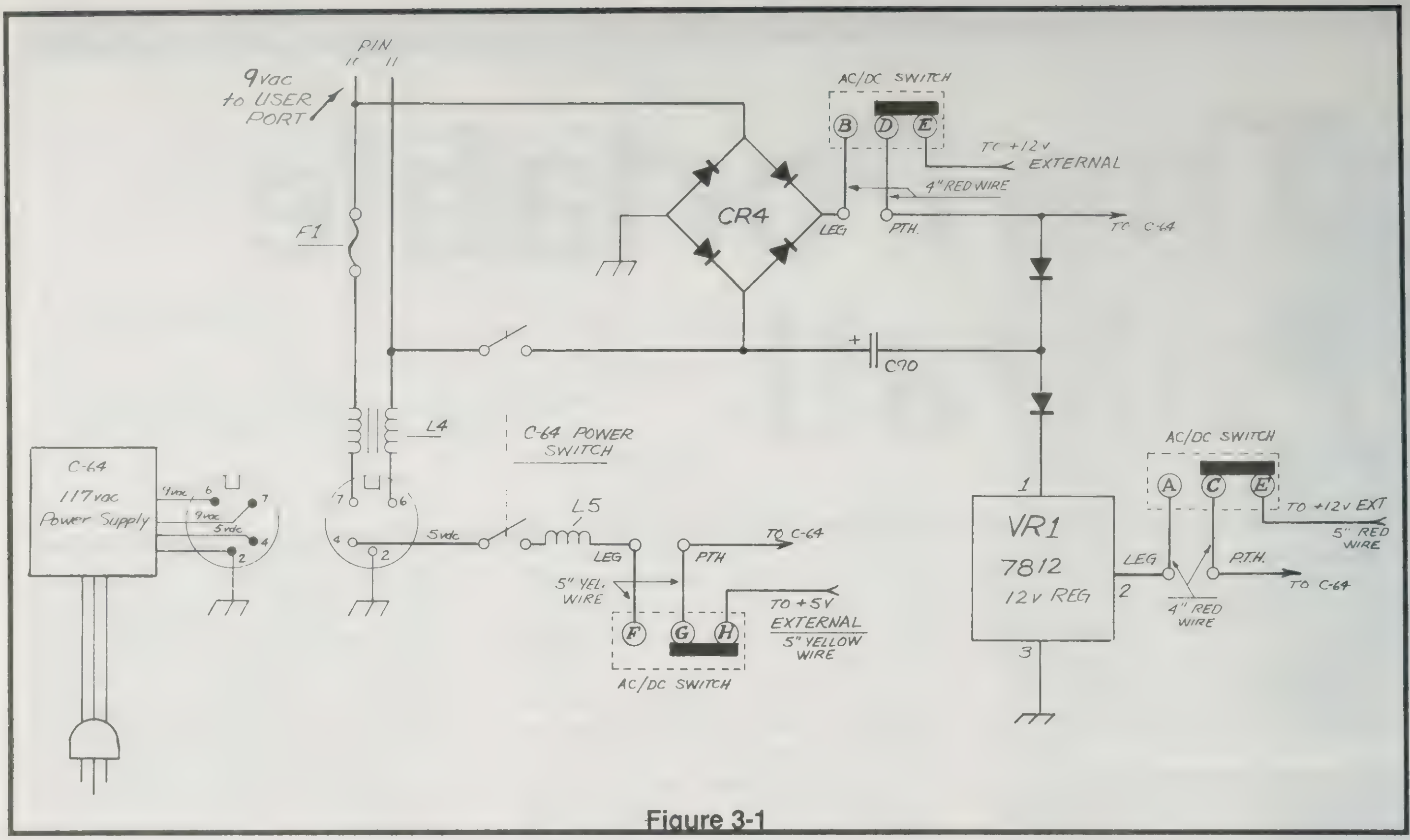


Figure 3-1

don`t understand something or feel things are getting out of hand. Should that happen you can call me on the phone (619) 727-5414 (voice only; no collect, afternoons are best) or you can write me a letter (sase, **please**.).

You can`t do the conversion over the telephone but I can answer questions, explain some obsure point, or discuss the pros and cons of various techniques. More importantly perhaps is the fact that I`m willing to do so. I`m as concerned with the successful completion of this conversion as you are.

There is one thing that is causing **me** to worry a lot; the fear I may have made a typo or screwed up a drawing in this revision. If I have, I`ve a hunch ten or a hundred of you will let me know.

How Long Will the Conversion Take?

After you`ve read this material **at least twice**, I will guess you`ll be from two to four hours on the C-64, what with flipping back and forth in the magazine to check the illustrations and so forth.

That`s for your first one; the next conversion you do should take about ninety minutes. (If you organize a Workshop, ten guys can do fifteen conversions in eight hours, including a break for lunch.) Study this first, and make sure you have the right parts and tools. Then just relax and work at your own pace.

Use The Workshop Method

If you don`t do a lot of electronic repair or construction it`s probably best to get a bunch of guys together and do all your conversions at one time using the Workshop approach. Guys with better skills can do the tight stuff while someone else does the easy parts.

And besides, it`s a lot more fun!

...But Not <u>MY</u> Workshop!

I`ve done a lot of conversions myself, partly because I know we **need** them but because I needed the money, too. But no more. So please don`t ask.

Sometimes people get a little upset at my refusal to do their rigs for them, assuming I`m holding out for more money. Others try to sway me with logic, such as: If I do **their** conversion, it would be one more digital system available -- better to light a candle than curse the darkness, etc.

I`m not sitting around cursing the darkness, I`ve already got a couple of candles flickering nearby. But a **few** candles won`t do the job; I`m trying to build an entire lighting system... and cranking the generator in my spare time.

A catastrophic earthquake is predicted to strike Southern California, most likely within the next thirty years. All indications are we will need **thousands** of battery powered high-speed digital stations like the one this conversion will provide. It`s obvious I can`t make a dent in those numbers doing them myself, but there`s one thing I *will* do. If any of you want me to instruct a Workshop for you, just say the word. When we get done you should be able to go out and conduct *more* workshops. That`s the only way I can see to

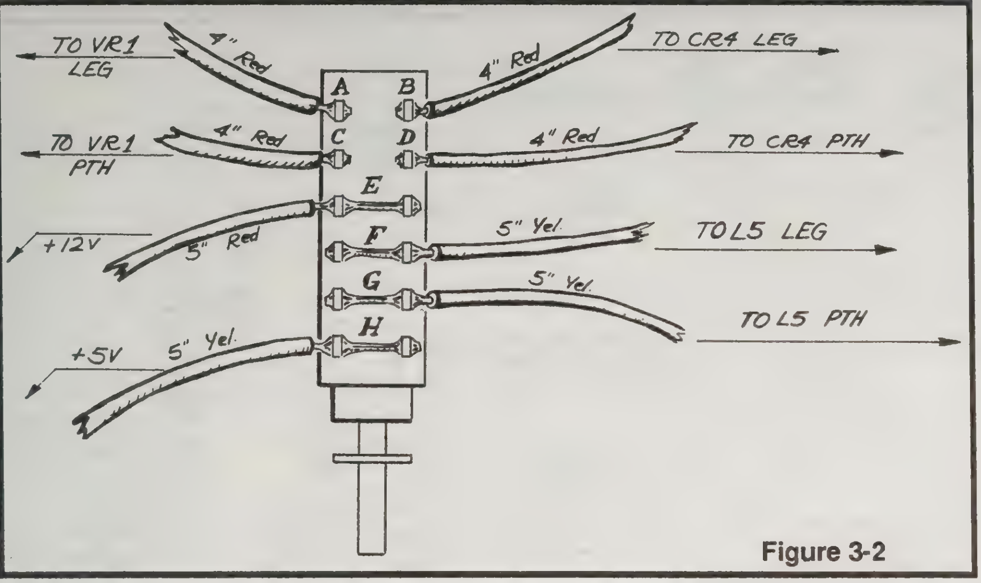


Figure 3-2

convert enough rigs to really make a difference.

Now let`s see if we can get this bird off the ground.

* * *

What We Will Do in Part 3

In **Part 1** of this series you built or bought a 60 Hz clock module; this is when we install it. If using a different module than the one shown in **Part 1** it may be of a different size, make sure it fits in the space available before going on with the conversion.

In **Part 2** of this series you built an outboard chassis to provide 5vdc and 12vdc to a pair of 3-pin DIN connectors. Now we are going to install the DIN jack in the C-64 case and an ac/dc switch to allow you to operate your C-64 from a car battery or other 12vdc source. Take a look at the schematic in Figure 3-1. Notice that the conversion calls for only relatively minor modifications to the circuit board. By lifting the legs of various components and wiring them through the ac/dc switch we can select either battery power or the regular 117vac power supply. We don`t need to cut any traces but we will have to move or replace a few components. You can return the C-64 to its original configuration at any time by simply reversing the conversion procedure.

Modify and Wire the Switch

Locate the 4PDT inline push-button switch you`ve bought and modify it by cutting off the lower PCB-style connector pins. Cut them off flush with the body of the switch so they can`t touch the circuit board when the switch is installed. Put the modified switch in your work holder with the eyelets up. It's a plastic switch so be careful not to crush it. Prepare eight wires by cutting them to length, stripping back each end 3/8" to 1/2", twisting and tinning. Try to use 18 gauge; 16 is too heavy and 22 too light for the 5v but probably okay for the +12. I used #18 for yellow leads (+5vdc) and #20 for the red leads (+12vdc). Don`t use bailing wire.

3 each, Yellow wire, 5" long
2 each, Red wire, 5" long
2 each, Red wire, 4" long
2 each, Red wire, 3" long
1 each, Green wire, 6" long

Install the wires on the switch as shown in Figure 3-2.

Attach Bridge Rectifier to Wiring

Locate the new bridge rectifier in your parts. Identify the positive leg (marked with a plus) and cut it to about 1". Bend the positive leg as shown in Figure 3-3. Slip a 1" long piece of heat-shrink tubing over the *wire* attached to **Terminal B** of the switch. Attach the same wire to the up-bent (+) leg of the rectifier. Make the joint smooth and neat then slide the heat-shrink tubing over the joint and seal it. Put the switch assembly aside until called for.

Dismantle the C-64

Clear your work surface and pad it with newspaper or a towel. Place the C-64 face-down on the pad with the front of the machine toward you. Locate and remove the three Phillips-head (+) screws in wells. Holding the case together, turn it back up-right.

With the C-64 in the normal operating position, raise the front of the upper part of the case; it will hinge open toward the rear. As you raise the front of the case you'll see two bundles of wires, a large bundle on the left and a small bundle - two wires - on the right. The large bundle is the connection between the keyboard and the computer, the small bundle goes to the power 'On' LED. Unplug both sets of wires.

If you`ve got one of the later model C-64`s the first thing you`ll see when you open the case is a

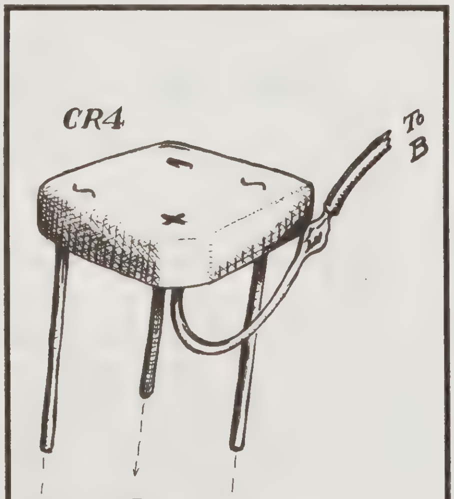


Figure 3-3

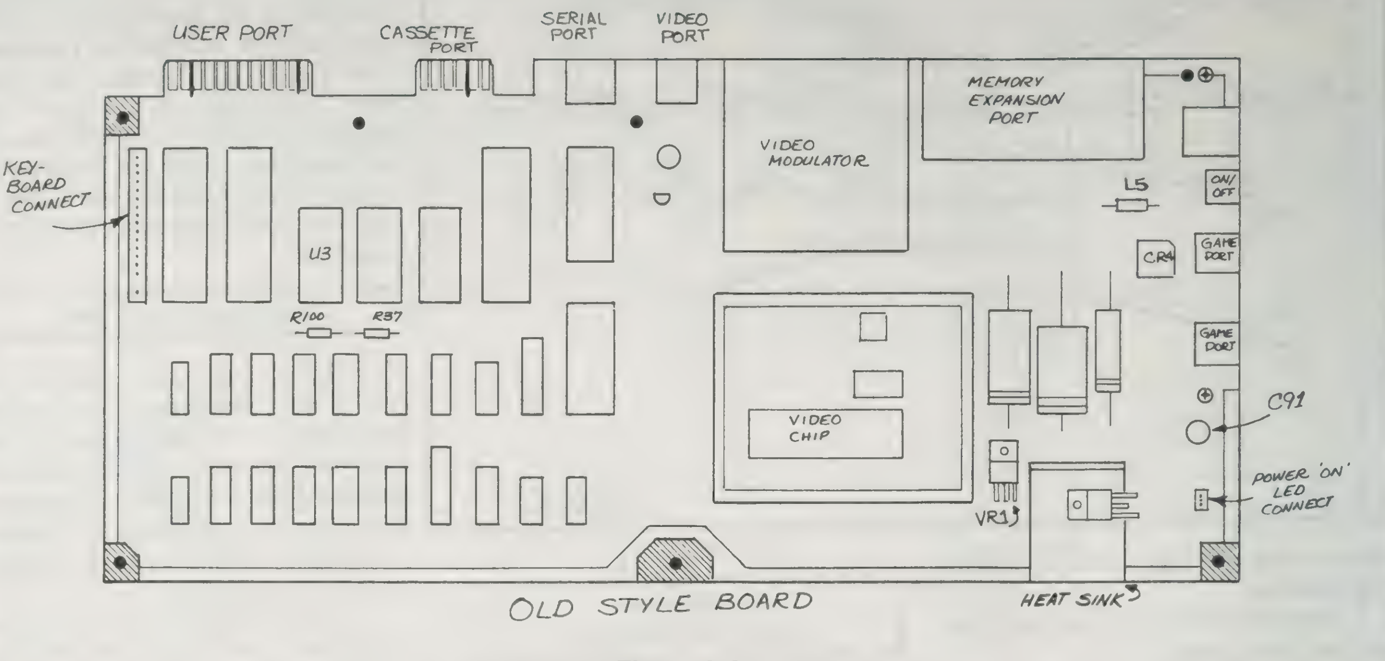


Figure 3-4

copper-colored piece of cardboard attached to the keyboard half of the case. The free edge of the cardboard is usually taped to the shield over the memory expansion port; peel it off but don`t tear it -- I`ll tell you more about it down below.

The top (keyboard) of the case is now free. Remove it and set it aside for later. (If part of a Workshop, mark the keyboard with the owner`s call sign.)

With the keyboard removed you`ll be looking down at the guts of the machine. If the left half of the board is covered by a metal shield, you have one of the older models. If it had a copper colored cardboard shield *AND* the video chip is in its own `corral`, you have a later revision, but there are many variations. As a result of repair work, field modifications, and other reasons, you`re liable to run into just about anything inside the case of your C-64. Check the circuit board layout against Figure 3-4 and Figure 3-5 to help you find your way around the board and determine which type you have. The conversion process is *exactly* the same for **ALL** types, only the position of some components is different.

The metal shield (old style) or the metalized cardboard (new style)

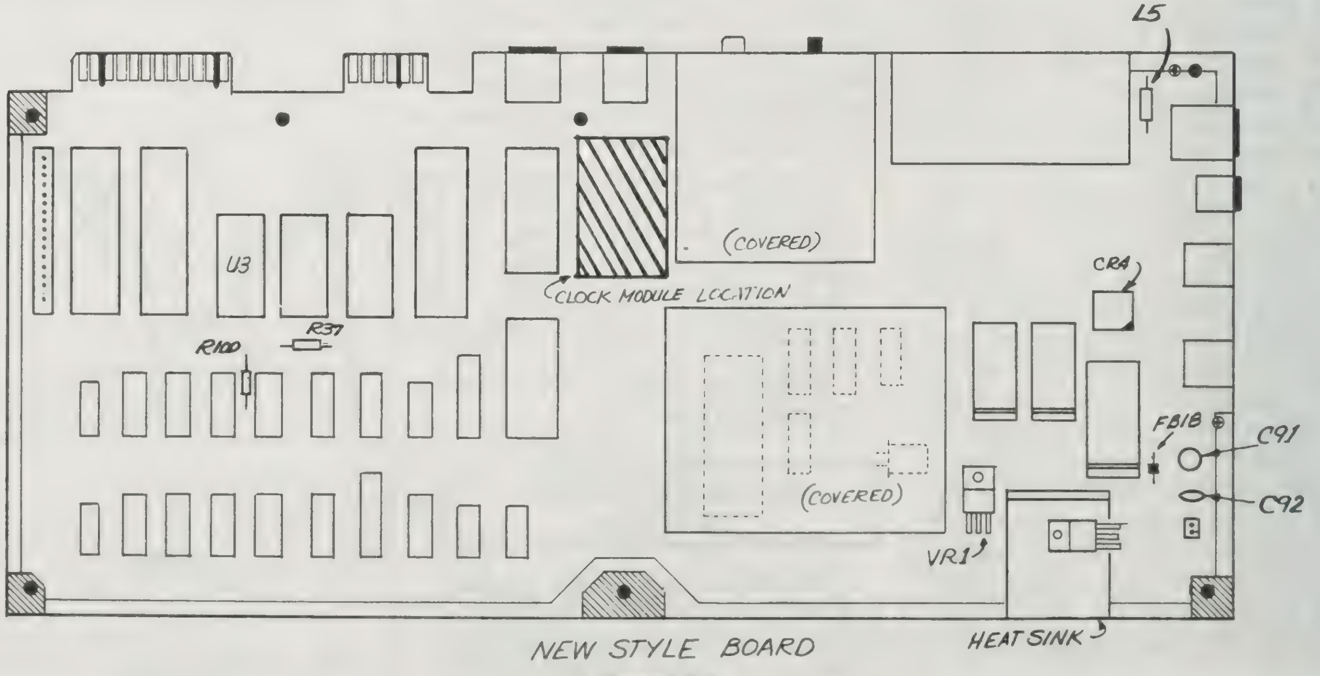


Figure 3-5

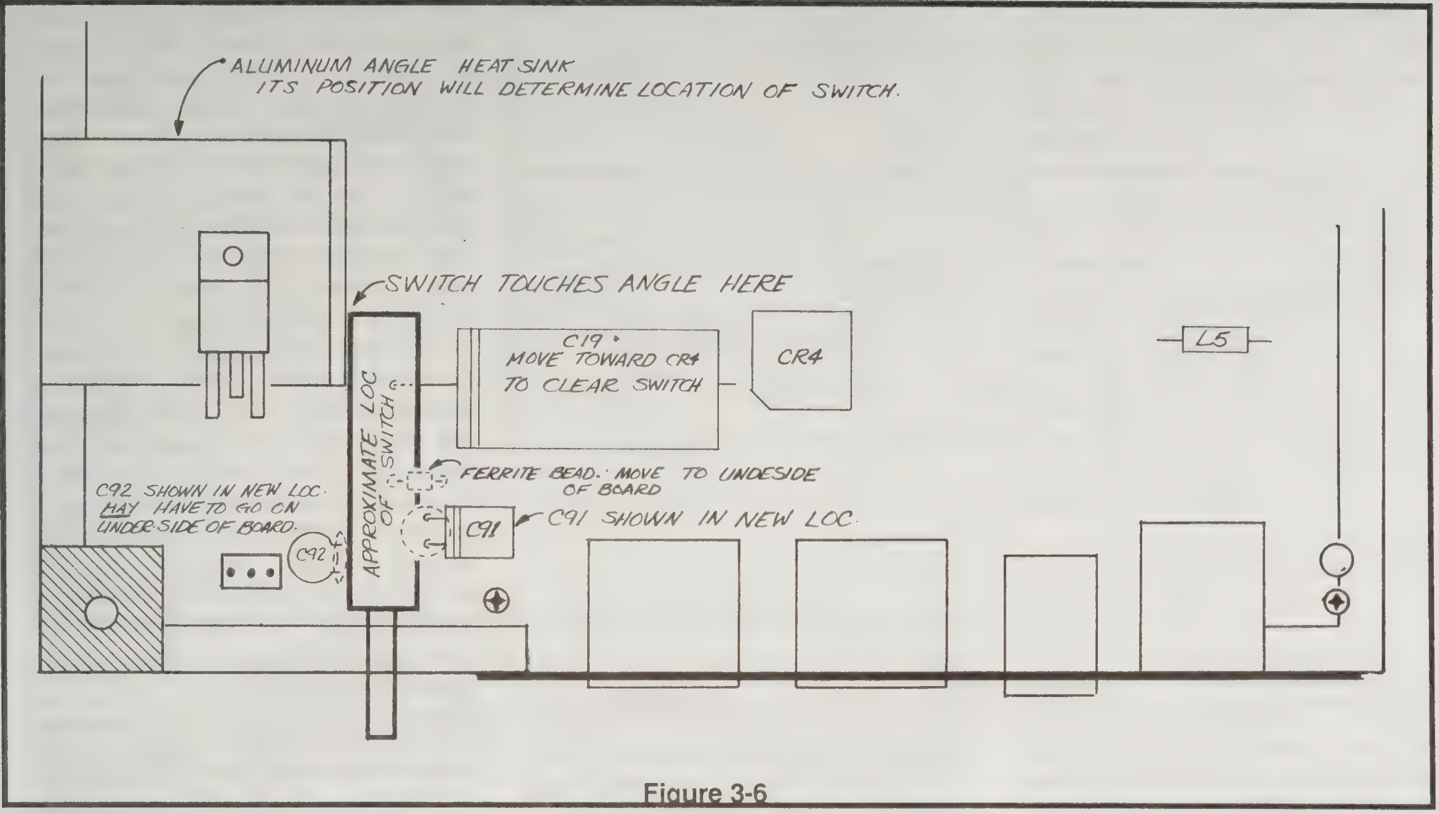


Figure 3-6

serves as an RFI shield. On the old style the shield also serves as a heat sink for some of the chips. On the new style boards the video chip is in a metal shield like the TV modulator and the lid of the can serves as a heat sink for the chip.

Remove the Heat Sink/RFI Shield

Locate and remove the five silver colored Phillips-head screws holding the heat sink/shield to the board. Remove them and the heat-sink (old style). Be careful not to touch the heat sink compound (the white slime) on the tabs; it isn't toxic, just messy. Put the shield aside.

Examine the right edge of the board and identify two gold colored Phillips-head screws; they are usually smaller than the silver colored screws. These screws hold the black facia panel to the circuit board and **DO NOT** need to be removed. After we learn our way around the board and lay-out the holes to be made in the lower part of the case, we`ll remove the two **silver colored** screws you`ll find near the corners of the circuit board (upper & lower right corners). Locate them now but don`t remove them until I tell you.

Identify the Components

Using Figure 3-4 identify the TV modulator, the expansion port shield, and the aluminum-angle heat sink. If part of a Workshop, put an identifying mark -- usually the owner's call sign -- on the expansion port shield. Using Figure 3-4, identify and locate the following: **CR4, VR1, C91, L5, R100**, and **R37.**

If you have a new style board, also identify and locate **C92** and the ferrite bead, **FB18**, between **C91** and the 2200 mfd cap **C19** (see Figure 3-5 and Figure 3-6). In order to make room for the switch you`ll have to move **C91, C92**, and the ferrite bead. But wait until I tell you.

Mark the Hole Locations

Use the dimensions shown in Figure 3-7 to lay out the locations of the DIN jack and switch access hole.

If you have the new style board the position for the switch access hole (the small hole) **MAY NOT BE CORRECT**, depending on the location of the aluminum angle heat sink on the circuit board. Here`s how to find out: **Trial fit** the switch against the aluminum angle heat-sink; it won`t fit down against the circuit board and the button will hang out over the edge of the case, but that`s okay, we just want to check the *alignment* of the switch. Look at Figure 3-6. If they line up, fine business. If not, determine the proper location for the switch hole and mark it.

The Trouble With C19

Study Figure 3-6. On the new version boards **C19**, the 2200mfd filter capacitor, comes very close to the aluminum angle heat sink, right where we want to mount our ac/dc switch. This problem usually crops up on those boards having an aluminum angle heat sink that is mounted slightly farther 'north' which brings about the problem I mentioned above, which is why I mention **C19** now. In *most* cases you can push C19 'north' enough to clear the ac/dc switch; the lead

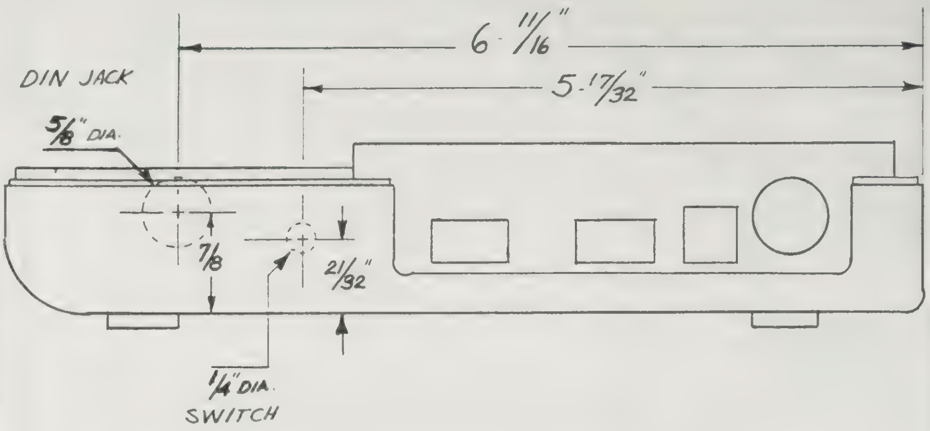


Figure 3-7

usually has some slack in it. But in a few cases you`ll have to lengthen the lead by splicing in a longer wire. (By this time the guys with old-style boards are usually rolling on the floor with laughter. Actually, it only takes about ten minutes longer to convert the new-style boards once you know how.)

When you trial-fit the switch you`ll be able to tell if you`re going to have to move C19, If so, make a mental note of it. I`ll mention it again at the proper time.

Remove the last two mounting screws from the circuit board. The board will now be free in the case and may be set aside for the moment.

Inspect Case For Damage

With the bottom of the case before you on the bench, examine the seven bosses (plastic 'hills') into which the screws were fastened. On most of the C-64's I see, one or more of the bosses has been damaged. On the old style boards the bosses must provide a secure hold for the screws if the RFI shield/heat sink is to work properly. If your rig has any damaged bosses, you can repair them using glue from the hot-glue gun but don`t do it now; wait until we heat up the gun to install the switch. (I`ll whistle when.)

With the circuit board removed from the lower half of the case, drill a 1/4" hole for the switch. If you`ve had to re-locate the switch-hole, be sure to drill on your new mark.

Check The Size Of Your DIN Jack

There seems to be no standardization for the **outer** diameter of DIN jacks, I`ve seen some as large as 3/4" -- a bit too large for this job. The diameter of the DIN jack should be between 9/16" and 5/8". If larger than 5/8", find a smaller one. The ones I bought from Mouser were a tad over 9/16".

Making the DIN Jack Hole

The best way to make the hole is to drill a 3/16" pilot hole and then use a 5/8" Greenlee (brand name) chassis punch. It`s neat, quick, and simple. But a lot of guys don`t have a chassis-punch set, and in a Workshop when doing a whole batch of conversions, a drill press does the job faster. But beware:

Twice during Workshops I`ve seen C-64`s wound up around the drill press like stiff taffy; in one case it tried to wind up the man doing the job as well! Both times the man at the drill had years of experience with shop work but thermoplastic isn`t cast iron -- this stuff can make a fool of you in a hurry. But it wasn`t a total disaster, we were able to re-install the C-64 circuit board into a VIC-20 case, picking up some valuable experience along the way.

If you`re doing just one conversion and don`t have a chassis punch, use a hand-brace and wood bit; not a spade bit, the auger-type, or a Fostner bit. And if you don`t have any of that stuff (or don`t know what the hell I`m talking about!...) then just cut out the mounting hole as a "U" with a coping saw. The top part of the case and the flange on the DI jack usually covers any gap.

Install the DIN Jack

After you`ve made the hole for the DIN jack, use the jack as a guide to lay-out the holes for the mounting hardware. Install the DIN jack into the case with the center lug, **UP** and the notch **DOWN**. Check the illustrations. Use #4 x 3/8" hardware to mount the jack but don`t tighten it down just yet.

Trial fit the top of the case and

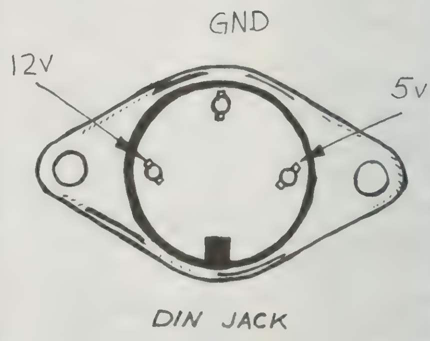
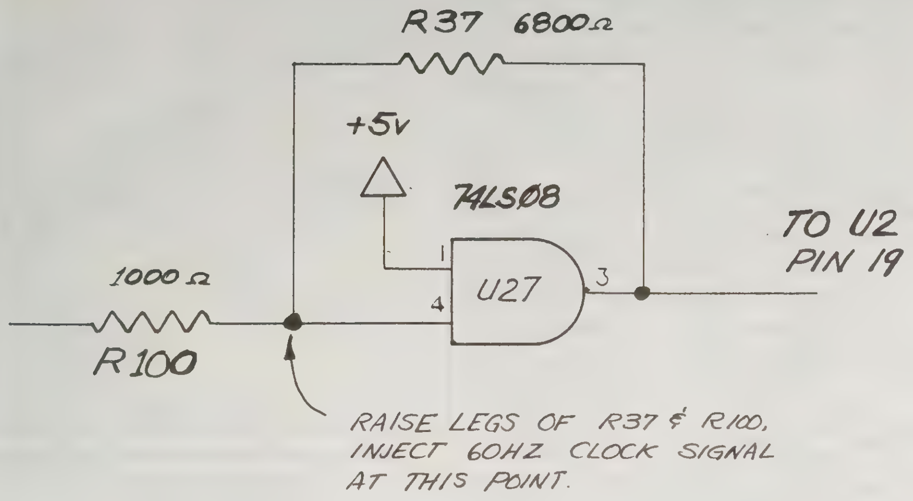


Figure 3-7A



RAISE LEGS OF R37 & R100, INJECT 60HZ CLOCK SIGNAL AT THIS POINT.

Figure 3-8

mark it where material must be removed to clear the DIN jack. The best tool for cutting the thermoplastic case is a dead-sharp pocket knife or a razor knife. Be careful here, removing only small amounts of material at a time. The plastic binds the blade and too much force will either leave you bleeding or the case looking like dog-meat. Remove enough material to allow the top and bottom halves of the case to mate. The flange of the DIN jack will conceal the cut. When you are satisfied with your work, put the top half of the case aside.

Solder a 6" long green wire to the center lug of the DIN jack. Make sure the free end is stripped and tinned. This is the ground lead; we'll solder it to the circuit board later. Set the lower half of the case, with the DIN jack loosely installed, aside for later.

The Circuit Board

Get the circuit board and examine the metal shield that covers its back (bottom) side. We must remove the shield in order to desolder components.

Remove Rear RFI Shield

With the circuit board flat on the table, locate and desolder the tabs fastening the shield to the circuit board. You'll need a desoldering tool to raise the tabs while you apply heat to the joint. The desoldering tool should have some angle to the tip; I use an old dental tool but almost anything will do.

When you've found and desoldered all of the tabs the circuit board will be free of the shield. Mark the shield (call sign) and set it aside with the cardboard insulator.

Inspect the Circuit Board

For many of you this may be your first look at a commercial-grade circuit board so relax and take a little time to examine the board. Notice the small size and close spacing of the traces. The quality of workmanship on the C-64 varies wildly. On some of the boards there are enormous quantities of excess solder, on others the quality of the work exceeds NASA standards. They all work but let`s hope you have one of the good ones; desoldering components is a bear when you`re working through an eighth inch of solder.

If this is your first exposure to commercial-grade printed circuit boards you won't be able to tell if your board is over-soldered, NASA quality, etc. But it should be obvious the component/trace density is greater than for a Heathkit or a circuit in some magazine construction project, and additional caution on your part is called for to prevent scratching a trace or making a solder bridge. And you need to know how to desolder. (See the inset article in this issue.)

Now Go To Work

Locate **CR4**. Mark the positive hole; use your 'Sanford' (brand name) marking pen and make a bold, black dot by the positive hole before you remove **CR4.** Now cut it free of the board. Remove the leads from the board. Desolder the 4 plated-through-holes (PTH).

Locate **L5**. On the old style board (**L5** near **CR4**) you want the right-hand leg; on the new style (**L5** up by the Memory Expansion Port) you want the top leg. Lift the indicated leg but leave the other leg alone; it stays where it is. Desolder the PTH.

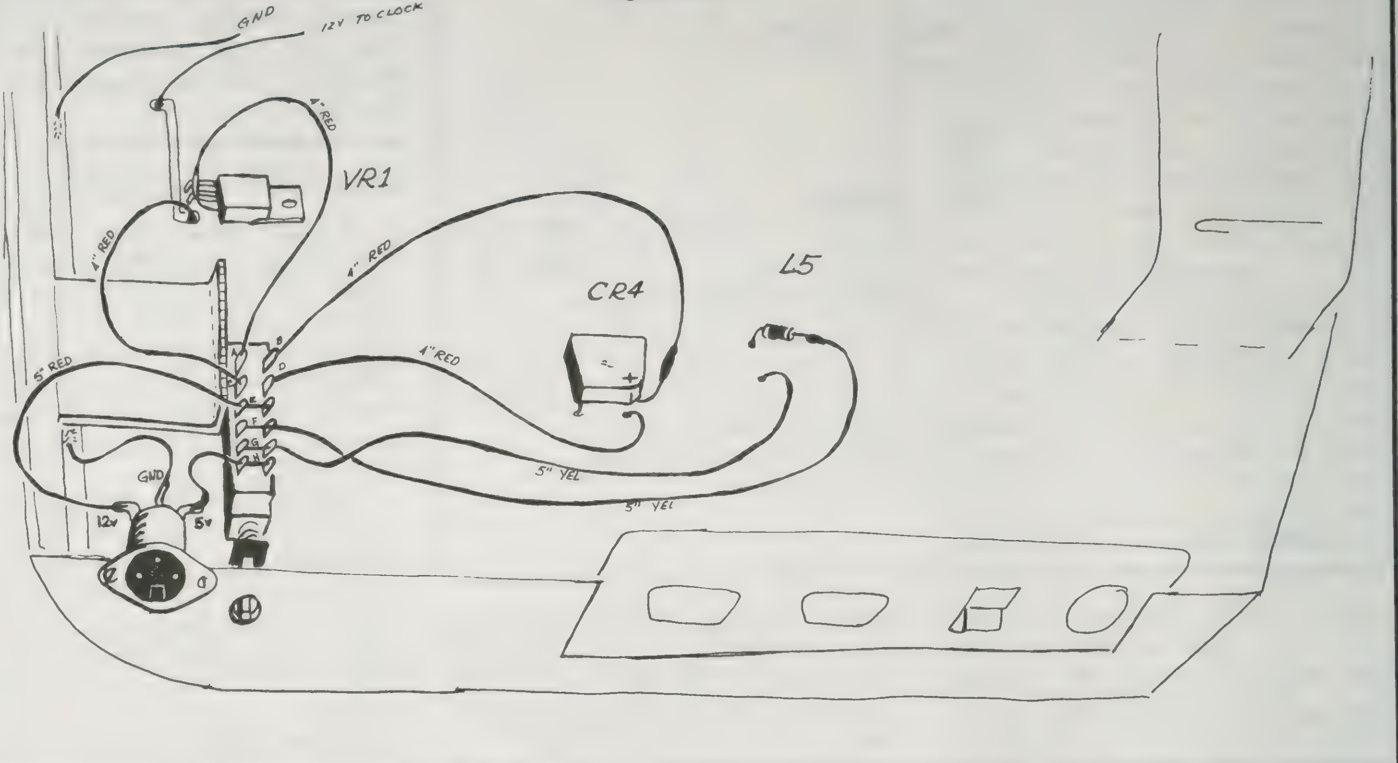
Locate **C91**. Identify the plus and minus leads, and mark the plus lead with a black dot. Cut **C91** free of the board and remove the leads from the board. Desolder the PTH`s.

In the parts you`ve bought, locate the new **C91** (100mfd/16v electrolytic capacitor) and put 1/2" long pieces of sleeving over its leads. The best sleeving for the job is Teflon, it doesn`t melt when you solder, but the vinyl insulation from some small-gauge hook-up wire serves almost as well.

Examine the board to identify the polarity of the PTH's where **C91** is installed. Orient the capacitor properly and install it about 1/2" **above** the board. After soldering, bend it down against the board, toward the Memory Expansion Port (ie, toward the back or rear edge of the board, away from the front or near edge of the board). This gives us the room we need to install the ac/dc switch.

If you have a new style board there's a ferrite bead, **FB18**, smack in the middle of where our ac/dc switch is to go. I want you to remove it **without damaging it**; we have to re-use it.. Use your sucker or solder wick and work from either the front or rear of the board, which ever works best.

Figure 3-9



Once you`ve removed it, ***reinstall it(!),*** but this time, put it on the ***back*** of the circuit board. I know this sounds crazy but believe me, it works just fine. (My thanks to Chuck Bates, W6JWX for this nifty little trick.)

C92, a .1mfd/25v ceramic disk cap you **may** find just south of **C91** *may* have to be put on the rear of the board as well. In some cases you can just bend it out of the way, if not, we`ll have to put it on the back. If you have a replacement for it just cut it off, remove the leads, clear the holes, and install the new one on the rear and bend it flat against the board. If you have to reuse the original part, remove it very carefully. (Old version or new, **C92** may... or may not... be installed. On boards which are marked for **C92** I install it if it`s missing. I`ve asked Commodore about this and other oddities on the C-64 but they`ve never responded.)

Locate **VR1**. Identify the right hand leg. There are three legs on this device; we want the one nearest the aluminum-angle heat sink. Raise the right leg and desolder the PTH it came from.

To provide power to the clock module I tapped into the 12v buss downstream from **VR1.** Locate **VR1**, find pin 2, the right-most leg, and follow that trace until you see a convenient plated-through hole. Desolder the hole; that`s where you`ll install the +12v lead for the clock module. The ground lead may be attached to any convenient ground point, such as the wide trace on the edge of the circuit board.

I picked-off power for my clock module as outlined above. On the newer style boards the clock module must be mounted beside the video modulator and there is a 12v buss nearer to it than the trace by **VR1**. But I can`t tell you exactly how to find it because I don`t have a new style board at hand *and I can`t read my notes(!).* Sorry. (If you can find it, go ahead and tap into it; it makes the power leads for the clock module a little shorter.)

Take a look at the schematic in Figure 3-8. This is how we inject the 60 Hz clocking signal into the existing circuit. The circuit is the same for most versions of the C-64 but the location of **R100** is different. Look at Figure 3-4 and Figure 3-5 to get some idea of where to find the resistors.

Locate **R100**. It is in a different position on each style of board; refer to the illustrations. On the old style board, raise the right leg. On the new style board raise the top leg. Don`t worry about the PTH`s, we don`t use them.

Locate **R37** - it's just beside R100 on the old style boards, over to the right about half an inch. You`ll have to look for it on the new style boards; its sort of northeast of R100. In either case, old style or new, raise the left leg -- the one nearest the keyboard connector -- and desolder the PTH. This is where we`ll inject our 60 Hz clock pulse.

Chuck Bates, W6JWX, used the following procedure: Measure the resistance between the pads of **R-100** and **R-37**, the legs you want to raise will show zero resistance since they are common. Chuck also recommends filling the **R-100** PTH with solder; on the new-style boards the trace comes to the top of the board through this hole.

That takes care of preparing the board to receive the modification. Take a break here and check your work before going ahead.

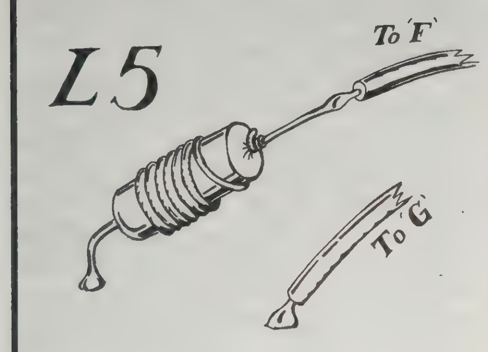


Figure 3-11

Installing the Modification

Your basic reference for this next section is Figure 3-9. I apologize for the poor quality of the drawing.

Locate the switch assembly with the bridge and wires attached. Identify the 5" long red wire soldered to **Terminal D** of the switch (see Figures 3-9 and 3-10) On the circuit board, identify the PTH for the plus-lead of CR1. Insert the red wire from **Terminal D** into the PTH. Solder it from the rear. Trim the lead.

Form the leads of the bridge rectifier (the new CR4) and insert it into the three remaining PTH's. Don't press it fully down against the board, you'll short the plus-lead. Inspect your work **before** you solder; make sure the bridge is properly oriented. **The rectifier may be oriented differently from my drawings. Check your work!** Solder from the rear and trim the leads.

Identify the lead soldered to **Terminal G** of the switch; see Figure 3-9 and 3-11. Slide a 1" long piece of heat-shrink tubing over the lead. Fasten the lead to the raised end of L5 using a hook/eye connection. Crimp the connection and solder. Make the connection bright and smooth. Slide the tubing over the solder joint and seal it.

(To 'seal it' means to heat the shrink tubing until it shrinks down around the joint.)

Identify the lead soldered to **Terminal F** of the switch and insert it into the PTH where we removed the **L5** lead; see Figure 3-6. Solder from the rear and trim the lead.

Identify the lead soldered to **Terminal C** of the switch; see Figure 3-9 and 3-12. Slide a 1" long piece of heat-shrink tubing over the lead and insert the free end into the PTH where we removed the **VR1** leg. Solder it from the rear and trim the lead. Slide the tubing down the lead to cover the switch terminal.

Identify the lead soldered to **Terminal A** of the switch. Slide **two** pieces of heat-shrink tubing onto the lead, each piece 1" long. Using a hook/eye connection, fasten the lead to the raised leg of **VR1**. Crimp the connection then solder. Cover the connection with heat-shrink tubing and seal it. Slide the other piece of tubing down to cover the switch terminal. Seal it and the tubing on **Terminal C.**

Locate the 60 Hz clock module and place it temporarily on the circuit board in the position shown in Figure 3-4 for the old style board or Figure 3-5 for the new style board. Trial fit the output lead and power leads; trial fit the **heat sink/RFI shield** (old style only) to insure it does not touch the clock module. When satisfied with lead length and module location, fasten it to the circuit board using double-sided foam tape.

Insert the clock module power leads into the PTH's near **VR1.** Refer to Figure 3-9 and the preceeding text. Solder from the rear and trim the leads.

Identify the PTH from which we raised the **left** leg of **R37**. Insert the output lead from the clock module. Solder from the rear and trim the lead.

If you have a new-style board, and if the lead of **C19** must be lengthened, do it now. With **C92** and the ferrite bead out of the way you can press the switch fully against the circuit board to get some idea of how far 'north' to move **C19.**

Using Figure 3-9 and other illustrations, verify your work wire-by-wire.

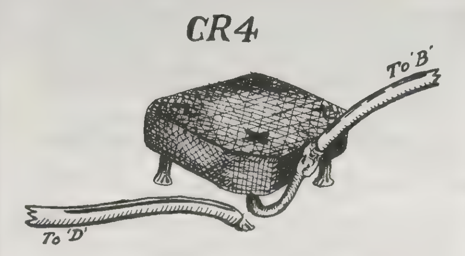


Figure 3-10

Installing The Switch

If you have any damaged screw bosses in the lower half of the case, now is the time to repair them. Heat up the glue gun and do the repair now.

Put the lower half of the case on the bench in the normal operating position and place the circuit board into the case. Locate and insert any two fasteners to keep it in position while we install the switch. Trial fit the switch by reference to Figure 3-6.The switch button should protrude from the side of the case **about 1/8"** when the switch is in the dc position (switch button **out**). Check to see that the switch is fairly centered in the access hole; it shouldn't touch the sides of the hole at any point. You can 'move' the hole slightly by enlarging it in the proper direction with a milling cutter or a file. When satisfied with the switch position, hold it in place and run a bead of glue along both of the long sides of the switch. Keep the glue out of the spring at the front of the switch. You`ll have to hold the switch in place while the glue cools/hardens.

Remove the two temporary fasteners and take the circuit board

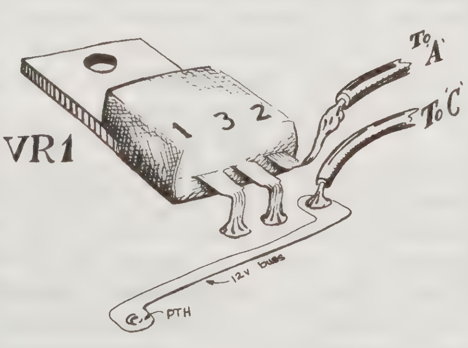


Figure 3-12

out of the case. Re-enforce the glue line if you wish - it's easier to do now, when the board is out of the case.

Reinstall The Lower Shield

Using your soldering iron, reflow the solder where the lower RFI shield was tacked to the edge of the circuit board. The object is to remove any peaks or lumps. Inspect the rear of the circuit board and remove any rosin with MEK, acetone or fingernail polish remover. You might also wish to record any data on the rear of the circuit board into your Programmer's Reference Manual (revision number, etc).

Locate the rear RFI shield and reflow the solder on the tabs, removing it where possible. Straighten the tabs and bend them **out** and **away** from the shield so they won't catch on the circuit board when you put it in place.

Locate the cardboard insulator and put it into the 'tray' of the RFI shield. Set the circuit board atop the shield, working carefully so that it seats fully down and the fastener holes are not blocked by the cardboard insulator. Bend the tabs back over the circuit board using finger pressure. Work slowly, making sure the sandwich remains in alignment. When the tabs are in position and finger-tight, use pliers to crimp them down but don`t over-do it. The RFI shield should be securely fastened after crimping (but before soldering). Trial fit the circuit board into the lower half of the case at this time, checking the upper right corner particularly for proper fit. Make sure the screw holes are aligned on the screw bosses and that the switch fits neatly into the access hole.

When you are satisfied with the fit, remove the circuit board and resolder the tabs. You'll find the tinned surfaces take very little solder to form a secure bond. Don't forget the obscure tabs behind the TV modulator. If the tabs spring back, hold them in place with a solder tool until the joint cools.

With the RFI shield soldered to the circuit board, return it to the case. Install just one fastener, the one in the upper right hand corner.

Reinstall the Upper Shield

Old style only: Locate the heat sink/RFI shield (the one with the white goo on the tabs). Bend the heat sink tabs very slightly downward; just hold the shield securely and poke down on the top of each tab, through the opening in the top of the shield. This is to insure the tab will make a firm contact with the chip when it is fastened to the circuit board. This is also why it was important to repair any damaged screw bosses; the screws fastening the shield must pull it down against the slight upward spring of the tabs, so don't bend them too far, and make sure the bosses are in good shape.

Put the shield into position on the circuit board, checking for Interference with the clock module, and making sure the holes line up with the screw bosses.

The screws are difficult to reinstall on the old style board due to the heat sink/RFI shield. The easiest method is to magnetize the blade of a #2 Phillips screwdriver. Once in place, be **extremely** careful how you tighten them, the plastic into which the screws are threaded will strip-out at less than one pound of torque.

Installing The DIN Jack

Take a good look at the DIN jack. Imagine you are standing inside the case and the **back** of the DIN jack is a clock. The "9 o'clock" lug is the 5vdc connector; the "3 o'clock" lug is for 12vdc. It`s a good idea to mark the voltages on the case; use a permanent-ink magic marker ("Sanford" is best). Refer to Figure 3-2 and Figure 3-9. Locate the yellow wire soldered to **Terminal H** of the switch. This is the 5vdc lead. Solder it to the **9 o'clock** lug on the DIN jack.

Locate the red lead soldered to Terminal E of the switch. This is the 12v lead; solder it to the **3 o'clock** lug of the DIN jack.

Solder the green ground lead coming from the center (12 o'clock) lug of the DIN jack to the edge of the circuit board near the aluminum angle heat sink. See Figure 3-9. Tighten the hardware holding the DIN jack but make sure you don`t over-tighten. It`s possible to tilt the DIN jack, preventing a neat fit of the top portion of the case.

Inspection Time

At this time it`s wise to have someone inspect your work, a difficult task for those of you working alone -- which is another reason I urge you to consider the Workshop method. An error in the 5v/12v wiring will destroy almost every chip on the board. **VERIFY YOUR WORK**, or, expect to buy a new computer and start all over.

Use all of the illustrations, check your parts (you have one mounting screw left over; use it if you can install it without moving the DIN jack), and check around your bench -- I`ve found some strange things installed **under** circuit boards.

Using any available piece of thin cardboard cut a small shield to fit atop the switch. You'll have to notch it to fit around the wires to **VR1.** This is not an insulator but a debris shield, intended to prevent foreign matter from shorting across the exposed power leads atop the switch. Fasten the shield to the switch with a **small** dab from the hot glue gun. Now pick up the C-64, turn it upside down, and **shake** it. If anything rattles or if anything falls off, fix it.

Loom The Wires

Using nylon tie-wraps, loom the wires neatly. Fasten the 60 Hz clock module power leads to the board with a couple of dabs from the hot glue gun.

Reinstall The Keyboard

Put the keyboard in position

atop the lower half of the case and trial fit to see all the wires are clear and it mates neatly with the DIN jack. If you have the coppercolored cardboard RFI shield you`ll need to notch it to clear the DIN jack. Do this carefully, as the metallic copper on the RFI shield **can** create a short circuit if it presses down on the DIN jack.

Identify the keyboard cable and position the connector properly (it's polarized) and plug it in. Do the same with the lead for the power-on LED indicator. The style of connector varies on the LED lead, some are bisexual and some are polarized. Connect it.

Close the case by hinging the keyboard-half into the rear of the lower half and lowering the front. Holding the case closed with your left hand along the front, power connector toward your belly, grasp the rear of the case with your right hand and squeeze it gently. The rear tabs (on the inside of the case) should click into place.

Turn the C-64 upside down and re-install the three screws; don't over tighten.

Testing The Conversion

Power up the system using the normal ac power supply (switch must be) **in** and exercise the computer with any available program. This is the confidence check, to show that nothing has been altered.

It is not wise to operate the system from **two** power sources **at the same time**, that is, if the C-64 is running from the ac mains, don`t operate the 1541 from a battery. This applys to **all** combinations of printer, disk drive and computer.

Verify that the cassette unit operates normally.

Power down the system, disconnect the ac power supply, switch to the battery position (switch is **out**) and connect the C-64 to the external regulator you assembled in Part 2 and turn it on.

Exercise the computer with any program (but not one loaded from disk; see above) to confirm proper operation. This is the 12vdc confidence test. At this time you may wish to meter your supply voltage and current at the external regulator.

Verify that the cassette unit operates normally.

The Time-of-Day clock in the 6526 CIA chip is now operating from the clock module you installed. Load the clock test program and allow the system to operate for as long as practical. Determine the rate (ie, gain or loss of time) of your particular module and make note of it. If the error is considerable you may wish to re-calibrate your clock module.

A Note About the Switch

During testing you will have noticed that it requires a tool of some kind to actuate the switch; your finger won`t do. This was intentional, as was the amount of protrusion of the switch. While testing the prototype I managed to turn off the computer accidentally by bumping the ac/dc switch against the battery cable, an ash tray, etc. You won`t have that problem. The amount of protrusion is sufficient to let you determine what mode you`re in by touch or sight, but insufficient to allow accidental switching.

If for some reason you have installed the switch so that it **can** be operated without a tool, I suggest you glue some sort of collar to the case, surrounding the switch, to prevent accidental contact.

All Done

This completes the modifications to the C-64. If this is your first reading of the conversion material, hold any questions you may have until you`ve been able to read through the instructions a second time. If you still have questions about a particular point, technique or procedure, don`t hesitate to drop me a line. Please state the question clearly, with reference to the drawing, page or paragraph, and please enclose a **sase** for a prompt reply. (But if it`s just burning your britches off, go ahead and call!)

Part 4 of this manual, covering the conversion of the 1541 disk drive, will appear in the next regular issue of **CTM.**

Robert S. Hoover, KA6HZF
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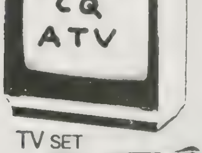
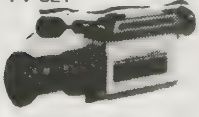
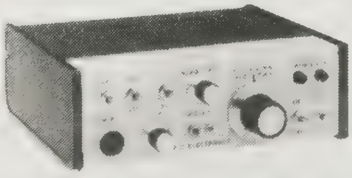


TV SET



TV CAMERA



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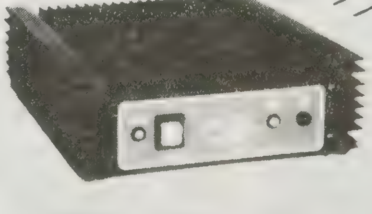

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By Robert D. Hartung

Musings and Meanderings

TS2068 & TS1000 Tutoring Program

One of the strong selling pitches for the low-priced home computer has been that it can help in the educational process, particularly in fundamental skills. In the U.K. many such programs were developed for Sinclair computers, but few of these seem to have ever gotten off the ground here in the U.S.

This program was originally written on my first computer, a ZX80 with 8K ROM, as a learning aid for some of the 200-plus foster sons I have accumulated over the years. Quite a few of these lacked fundamental math and reading skills, and several showed indications of dyslexia. The fractional-measure routine was developed for one boy who wanted to learn building trades but could not read the markings on a tape-measure of square. The vocab drill routine is based on a method developed by a friend of many years in Canada who is reading therapist. It uses a "flash-card" approach to display random nonsense words. (You may want to make substitutions for some of the consonants in the source string to avoid the occasional X-rated random output!)

Because of its length, the listing will be presented in two parts, but each segment will run by itself when entered with the menu. As given, Part 1 of the program will run on a TS2068 or ZX81/TS1000/1500, except that for the latter "SPACE" in lines 2990 and 3140 should be changed to "." or "PERIOD" and "." used in lines 3060 and 3200 instead of " ". Also, the "+" character should be keyed in instead of a space to denote an answer of 1 + a fraction in the fractional-measure exercise. Part 2 will include math drills in addition, multiplication, and division, with subtraction practice as a function of the division process.

The TS2068 version is available on cassette for $3.00 to cover the cost of the tape, postage, and handling. For $7.00 a copy of the Beta Basic Demo will also be included. Please note that the BB Demo will work in Spectrum mode only and cannot be edited or used with any other listing.

```
  20 GO TO 3390
2260 RUN
2300 REM FRACTIONAL-MEASURE
2310 CLS
2320 PRINT AT 20,0;"PRESS C TO C
HANGE"
2330 LET U=0
2340 LET C=U
2350 LET T=U
2360 LET P=0
2370 FOR N=0 TO 31 STEP 4
2380 PRINT AT 11,N;"▌";AT 10,N;"
 "
▪
2390 NEXT N
2400 FOR N=2 TO 30 STEP 2
2410 PRINT AT 11,N;"▌"
2420 NEXT N
2430 FOR N=0 TO 31
2440 PRINT AT 12,N;"▙"
2450 NEXT N
2460 PRINT AT 9,0;"▌"
2470 PRINT AT 10,0;"▌"
2480 PRINT AT 10,16;"▌";AT 9,16;
"  "
 ▪
2490 PRINT AT 10,8;"▌";AT 10,24;
"▌"
2500 PRINT AT 1,0;"ENTER NO. THE
N /2 OR /4 OR /8 OR /16",,"THEN
A FOR ANSWER--WAIT FOR NEXT"
2510 PRINT AT 18,0;"ANSWER SHOWN
 WITHOUT INPUT ","EXCEPT FOR LEV
EL 1"
2520 PRINT AT 14,0;"0";AT 14,16;
"1"
2530 PRINT AT 5,0,
2540 PRINT AT 7,0,
2550 PRINT AT 13,U;" "
2560 LET A$=""
2570 LET B$=""
2580 LET T=INT (RND*32)
2590 IF T=0 THEN GO TO 2580
2600 PRINT AT 13,T;"▌"
2610 LET U=T
2620 IF T>=16 THEN LET T=T-16
2630 LET V=T
2640 PRINT
2650 IF Y>1 THEN GO TO 2840
2660 PAUSE 40000
2670 IF INKEY$="C" THEN GO TO 33
90
2680 LET A$=INKEY$
2690 LET B$=B$+A$
2700 PRINT AT 5,0;
2710 IF A$<>"A" THEN PRINT B$;
2720 IF A$="A" THEN GO TO 2740
```

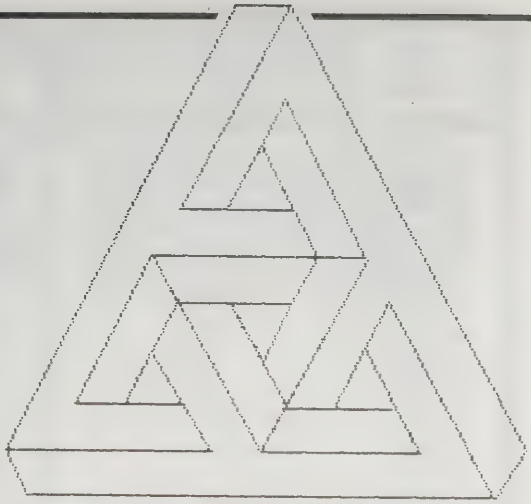
```
2730 GO TO 2660
2740 LET X=0+2*(U>=16)
2750 PRINT AT 7,0;("1" AND (U>=1
6));AT 7,X;U;"/16   "
2760 IF U/2-INT (U/2)=0 THEN PRI
NT AT 7,X;U/2;"/8    "
2770 IF U/4-INT (U/4)=0 THEN PRI
NT AT 7,X;U/4;"/4    "
2780 IF U-8=0 THEN PRINT AT 7,X;
U/8;"/2    "
2790 IF U=0 OR U=16 THEN PRINT A
T 7,2;"       "
2800 PRINT "CORRECT ANS."
2810 PAUSE 300
2820 PRINT AT 8,0;"              "
2830 GO TO 2530
2840 IF Y=2 THEN PAUSE 1000
2850 IF Y=3 THEN PAUSE 800
2860 IF Y=4 THEN PAUSE 500
2870 IF Y=5 THEN PAUSE 200
2880 IF INKEY$="C" THEN RUN
2890 GO TO 2740
2900 REM VOCAB DRILL
2910 CLS
2920 LET A$="AEIOUBDGMNPTYCFHKLR
SVWZJQX"
2930 PRINT "FLASH-WORDS",,,,"KEY
:",,"A FOR RANDOM CONSONANTS/VOW
ELS",,,"C FOR CHOSEN CONSONANTS"
,,,"V FOR CHOSEN VOWELS"
2940 IF INKEY$="" THEN GO TO 294
0
2950 CLS
2960 IF INKEY$="C" THEN GO TO 30
80
2970 IF INKEY$="V" THEN GO TO 32
40
2980 CLS
2990 PRINT "HOLD KEY FOR ENDING 
LETTER","SPACE TO CHOOSE CONSONA
NTS","7 TO MENU"
3000 LET V$=INKEY$
3010 IF V$="7" THEN RUN
3020 LET W$=A$(INT (RND*18)+6)+A
$(INT (RND*5)+1)+A$(INT (RND*9)+
6)
3030 PRINT AT 11,14;W$+INKEY$;"
 "
3040 FOR N=1 TO (15-Y*2)*10
3050 NEXT N
3060 IF INKEY$=" " THEN GO TO 30
80
3070 GO TO 3000
3080 CLS
3090 PRINT "ENTER BEGINNING LETT
ER"
3100 INPUT B$
3110 PRINT ,,,,"ENTER ENDING LET
TER"
3120 INPUT C$
3130 CLS
3140 PRINT "PRESS:",,,,"ENTER FO
R NEXT WORD","A FOR NONSENSE WOR
DS","SPACE TO CHANGE CONSONANTS"
,,,"KEY-IN ENDING LETTER"
3150 PRINT AT 11,17;" "
3160 PRINT AT 11,14;B$;A$(INT (R
ND*5)+1);C$;
3170 PRINT INKEY$
3180 FOR N=1 TO 40
3190 NEXT N
3200 IF INKEY$="" THEN GO TO 320
0
3210 IF INKEY$="A" THEN GO TO 29
80
3220 IF INKEY$=" " THEN GO TO 30
80
3230 GO TO 3150
3240 CLS
3250 PRINT "PRESS:",,"7 FOR MENU
"
3260 PRINT "VOWEL FOR NEXT WORD"
,"C TO CHOOSE CONSONANTS"
3270 IF INKEY$="7" THEN GO TO 33
90
3280 PRINT AT 14,14;A$(INT (RND*
18)+6);
3290 IF INKEY$="" THEN PRINT A$(
INT (RND*5)+1);
3300 PRINT INKEY$;
3310 PRINT A$(INT (RND*9)+6);
3320 PAUSE (20-Y*2)*10
3330 IF INKEY$="" THEN GO TO 324
0
3340 IF INKEY$="C" THEN GO TO 30
80
3350 FOR N=1 TO 50
3360 NEXT N
3370 CLS
3380 GO TO 3240
3390 CLS
3400 PRINT "ENTER LEVEL OF DIFFI
CULTY:         1, 2, 3, 4, 5 (HIGH

EST)"
3410 PAUSE 40000
3420 CLS
3430 LET Y=VAL INKEY$
3440 PRINT "PRESS:",,,,
3450 PRINT "ENTER TO CHANGE DIFF
ICULTY"
3460 PRINT "V FOR VOCABULARY DRI
LL"
3470 PRINT "A FOR ADDITION"
3480 PRINT "D FOR DIVISION"
3490 PRINT "M FOR MULTIPLICATION
"
3500 PRINT "F FOR FRACTIONAL-MEA
SURE"
3510 PRINT "R FOR RANDOM CHOICE"
3520 PRINT "SPACE FOR STOP"
3530 PAUSE 40000
3540 IF INKEY$="A" THEN GO TO 70
0
3550 IF INKEY$="D" THEN GO TO 14
00
3560 IF INKEY$="M" THEN GO TO 30
3570 IF INKEY$="V" THEN GO TO 29
00
3580 IF INKEY$="F" THEN GO TO 23
00
3600 IF INKEY$="R" THEN GO TO 36
40
3610 CLS
3620 IF INKEY$=" " THEN STOP
3630 GO TO 3390
3640 CLS
3650 LET X=INT (RND*5)+1
3660 IF X=1 THEN GO TO 30
3670 IF X=2 THEN GO TO 700
3680 IF X=3 THEN GO TO 1400
3690 IF X=4 THEN GO TO 2300
3700 IF X=5 THEN GO TO 2900
3710 GO TO 3420
9000 SAVE "TUTOR" LINE 9010
9010 POKE 23658,8: GO TO 3390
```

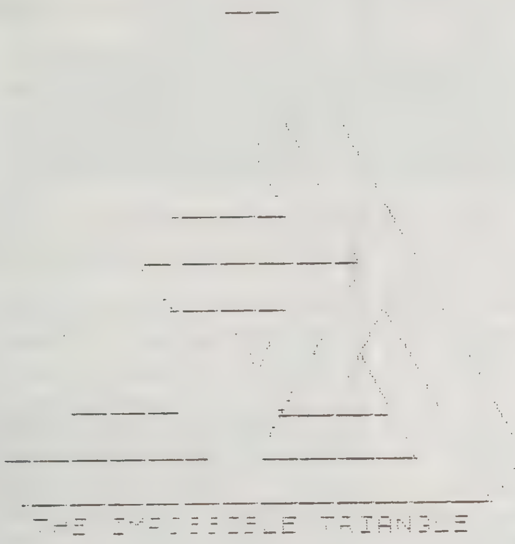
Robert D. Hartung
2416 N. County Line Road
Huntertown, IN 46748 **CTM**

Answer
To the Mystry Program for the T/S 2068

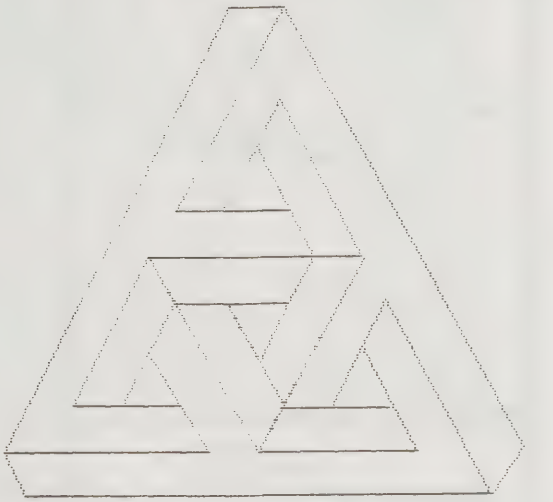
Thanks for your inputs and making CTM better. We may get more from Frank later. These four are the first I received out of many.



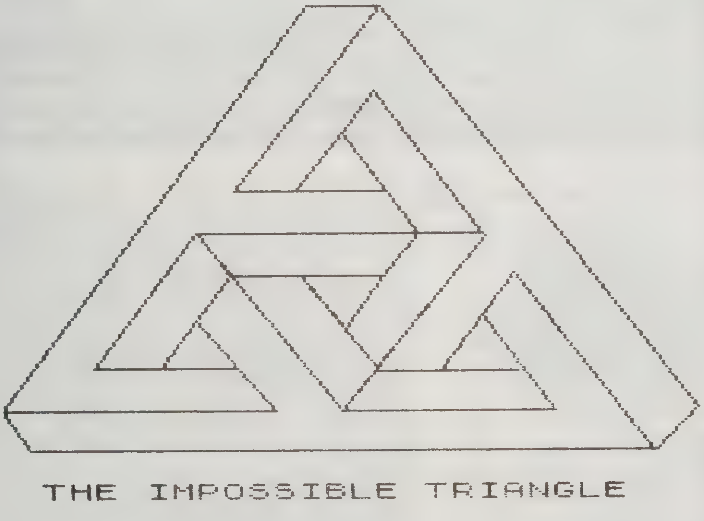
The ORIGINAL
by Frank Bouldin, W5GAA



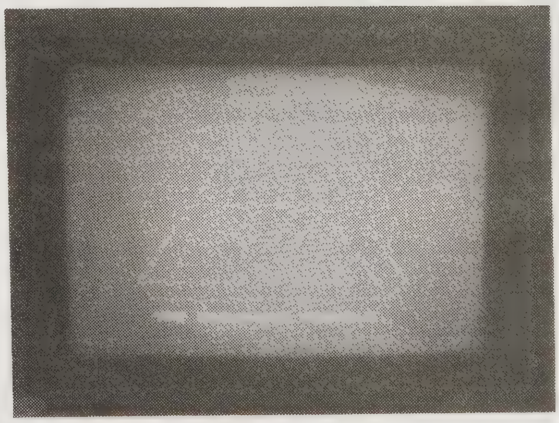
By Judy Muir, Forbes Road, PA



By Dean Balwin, White City, KS

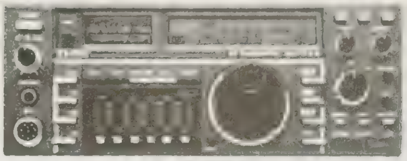


James A. Henderson, Peoria, IL

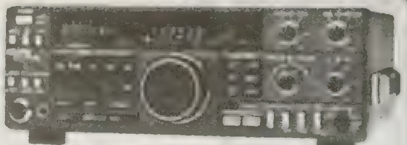


Robert L. Howard, West Covina, CA

ICOM KENWOOD YAESU


IC-735

HF Equipment	List	Juns
IC-735 Gen. Cvg Xcvr	999.00	Call $
IC-745 Gen. Cvg Xcvr	1049.00	Call $
IC-751A Gen. Cvg Xcvr	1649.00	Call $
Receivers		
IC-R7000 25-1300+MHz Rcvr	1099.00	Call $
IC-R71A 100kHz-30 MHz Rcvr	949.00	Call $
VHF		
IC-271A All Mode Base 25w	859.00	Call $
IC-271H All Mode Base100W	1099.00	Call $
IC-27A FM Mobile 25w	429.00	Call $
IC-27H FM Mobile 45w	459.00	Call $
IC-28A FM Mobile 25w	429.00	Call $
IC-28H FM Mobile 45w	459.00	Call $
IC-2AT FM HT	299.00	Call $
IC-02AT FM HT	399.00	Call $
IC-U2AT	NEW!	Call $
UHF		
IC-471A All Mode Base 25W	979.00	Call $
IC-471H All Mode Base 75w	1339.00	Call $
IC-47A FM Mobile 25w	549.00	Call $
IC-4AT FM HT	339.00	Call $
IC-04AT FM HT	449.00	Call $
IC-3200A FM 2m/70cm 25W	599.00	Call $
220MHZ		
IC-37A FM Mobile 25w	499.00	Call $
IC-3ATFM HT	339.00	Call $
Repeaters		
IC-RP3010 440 MHz	1229.00	Call $
IC-RP1210 1.2 GHz	1479.00	Call $


TS-440S/AT

HF Equipment	List	Juns
TS-940SAT Gen. Cvg Xcvr	2249.95	Call $
TS-940S Gen. Cvg Xcvr	2049.95	Call $
TS-930S/AT Gen. Cvg Xcvr	1849.95	Call $
TS-830S Xcvr	1099.95	Call $
TS-530SP Xcvr	899.95	Call $
TS-430S Gen. Cvg Xcvr	819.95	Call $
TS-440S/AT Gen. Cvg Xcvr	1199.95	Call $
TS-440S Gen. Cvg Xcvr	1049.95	Call $
Receivers		
R-5000 NEW!	899.95	Call $
R-2000 150kHz-30 MHz	649.95	Call $
TS-670 All Mode Quad 6M	799.95	Call $
VHF		
TS-711A All Mode Base 25w	899.95	Call $
TR-751A All Mode Mobile 25w	599.95	Call $
TM-201B FM Mobile 45w	369.95	Call $
TM-211A FM Mobile 25w	399.95	Call $
TM-2530A FM Mobile 25w	429.95	Call $
TM-2550A FM Mobile 45w	469.95	Call $
TM-2570A FM Mobile 70w	559.95	Call $
TH-21AT FM, HT	249.95	Call $
TR-2600A FM, HT	359.95	Call $
UHF		
TS-811A All Mode Base25w	1049.95	Call $
TM-401B FM Mobile 25w	399.95	Call $
TM-411A FM Mobile 25w	449.95	Call $
TH-41AT FM, HT	259.95	Call $
TR-3600 FM HT	369.95	Call $
220MHZ		
TM-3530A FM 220MHz 25w	449.95	Call $
TH-31AT FM 220 MHz HT	259.95	Call $
TL-922A HF Amp	1499.95	Call $

FT 757GX

HF Equipment	List	Juns
FT-ONE Gen. Cvg Xcvr	2859.00	Call $
FT-757GX Gen. Cvg Xcvr	995.00	Call $
FT-767 4 Band New	1895.00	Call $
Receivers		
FRG-8800 150kHz-30 MHz	599.95	Call $
FRG-9600 60 - 905 MHz	679.95	Call $
VHF		
FT-270RH FM Mobile 45w	439.95	Call $
FT-23R/TT Handheld NEW!	299.95	Call $
FT-209RH FM Handheld 5w	359.95	Call $
UHF		
FT-770RH FM Mobile 25w	479.95	Call $
FT-73R/TT NEW!	314.95	Call $
FT-709RH FM HT 4w	359.95	Call $
VHF/UHF Full Duplex		
FT-726R All Mode Xcvr	1095.95	Call $
6m/726 6m Module	269.95	Call $
430/726 430-440MHz	329.95	Call $
440/726 440-450MHz	329.95	Call $
HF-726 10-15-20M	289.95	Call $
SU-726 Sate Duplex	129.95	Call $
Dual Bander		
FT-2700RH FM 2m/70cm 25W	599.95	Call $
220MHZ		
FT-109 RH New HT	TBA	Call $
FT-690 R/II 6mtr. 10W All Mode	569.95	Call $
FT-290 R/II 2mtr. 25W All Mode	579.95	Call $
Repeaters		
FTR-2410 2m Repeaters	1249.95	Call $
FTR-5410 70cm Repeaters	1289.95	Call $

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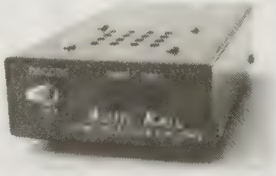
- ★ 8-15 VDC. CMOS circuitry provides for low current operation.
- ★ Built-in speaker. External speaker jack also provided.
- ★ Measures only 1¼ x 3 x 5½ inches. ★ Decodes all 16 digits.

*Touch-Tone is trademark of AT&T



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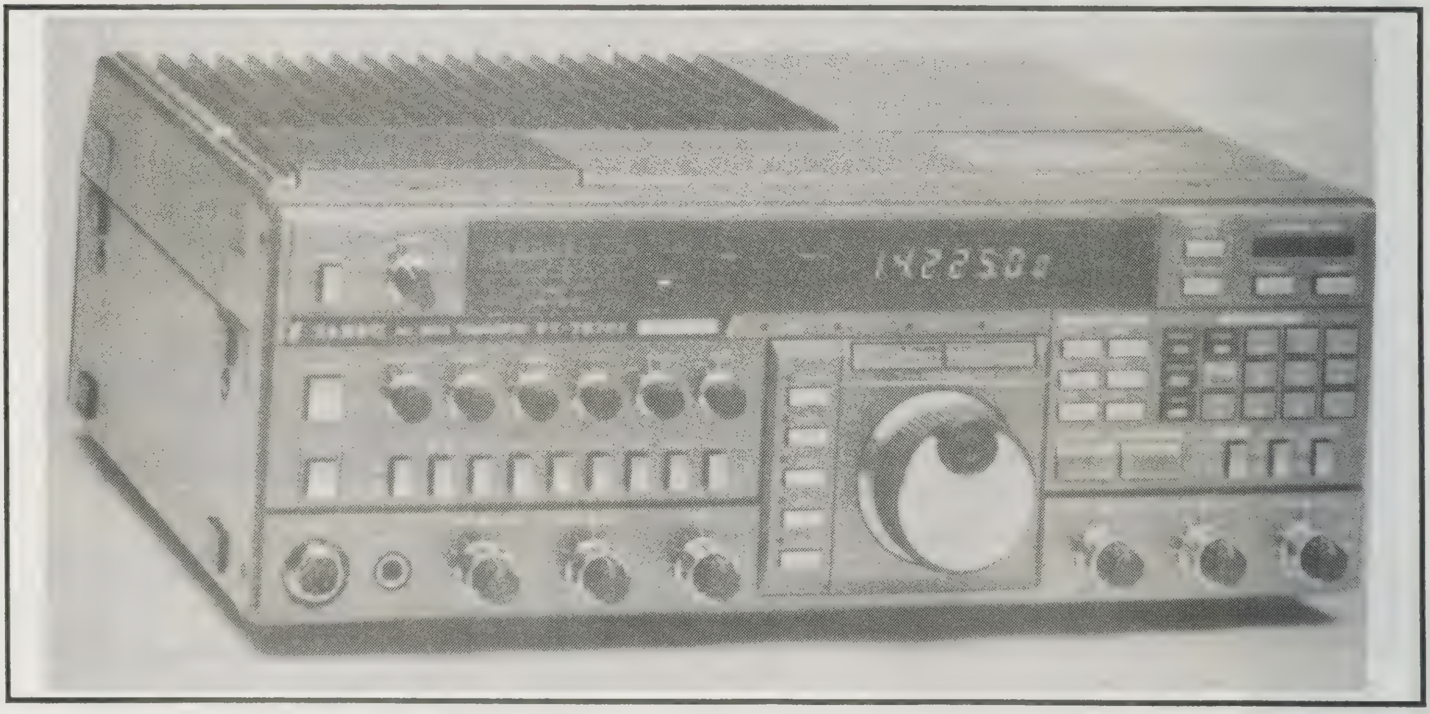
By Jim Griffith, WA5RAX

Yaesu's FT-767GX

A review of this one package ham station - just add the antennas



If you want everything you could possibly think of in one rig, then you ought to take a look at the Yaesu FT-767GX transceiver. Although it has a pretty hefty price tag, it also sports all the "chrome" you would need in an amateur radio transceiver regardless of the band you are working. Let's take at a look at its general features, operator interface, and test results.

General Features

Frequency Coverage

First, the FT-767GX transceiver provides complete coverage for the HF amateur bands. Its frequency range is from 1.5 Mhz to 29.99999 Mhz in specific amateur band ranges with a rated 100 watts output. After contacting the engineers at Yaesu, we learned there was a simple modification which would allow the rig to operate at any frequency. After performing this mod, we were able to test the rig on any of the MARS frequencies with the same features and performance as provided in the amateur bands. Hence, as with a lot of other HF rigs, you are can

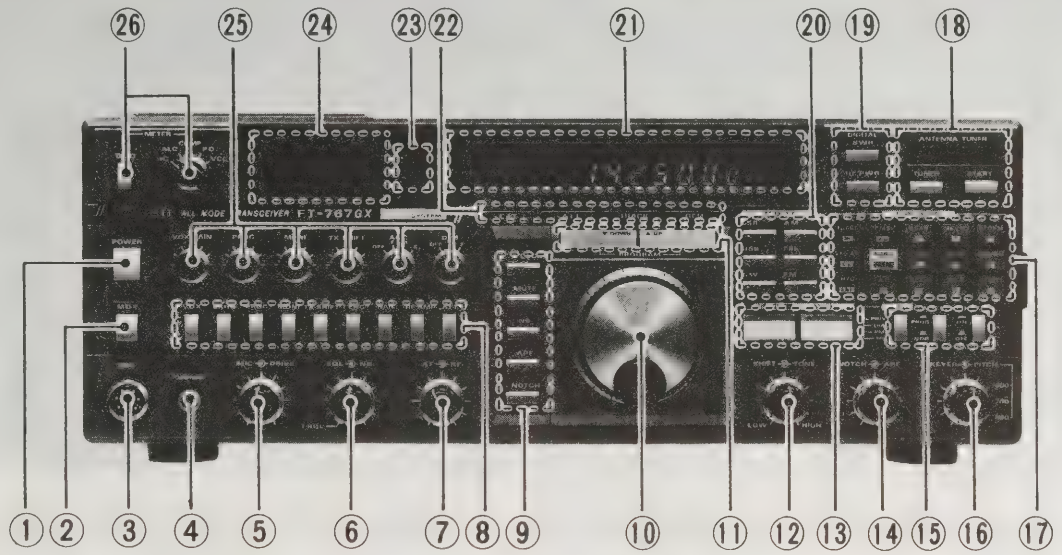


Fig. 1 Operator Interface

perform mods to allow its usage outside the ham bands.

Six meters (50 to 54 Mhz, 10 watts output), two meters (144 to 148 Mhz, 10 watts output), and seventy cm (430 to 440 Mhz, 10 watts output) are provided. These capabilities are supplied through plug in modules which are very easy to install and allow usage of special features built into the rig which are much like those found on some of the best single VHF or UHF rigs you can buy. Unlike a lot of other transceivers which give you access to both HF and VHF ranges but specialize in features for HF, the FT-767GX does not compromise.

Dual independent VFOs as well as ten memories allow for easy frequency changing. This does not include the flexibility afforded by the Yaesu CAT system which allows complete computer control. We will get into the CAT system a little later.

Modes of Emission

The FT-767GX will allow transmission in the following modes without modification or having to buy additional boards: LSB, USB, CW, AFSK, AM and FM. For you packet experts, this is the first rig we have ever seen that devotes a section to working packet. There is even reference to some of the modern day TNC2 clones as well as how to get started on VHF packet operation. Finally there is a jack which allows hookup from your packet (TNC) terminal node controller directly to the VHF or UHF modules which provides no pre/de-emphasis receiver output as well as 10k Ohm output impedence. Input impedence is 600 ohms for the audio mic input.

Frequency Stability

The FT-767GX was found to be extremely stable with specification provided of ±3 PPM after only 15 minutes warm up. In critical packet mailbox operation we found the rig to be very stable and able to hold to tolerance.

Antenna Tuner

A built in antenna tuner is part of the standard equipment of the FT-767GX. It is fully automatic and all you have to do is "push the button." While the tuner is in operation warning lights are provided to the user to provide an indication of the tuning process. We found the rig to be pretty well protected in output power to badly mismatched loads. Only one antenna connection is provided in the rear for connection of an HF antenna. Separate antennas are provided on the modules when you purchase the VHF and UHF modules. Its interesting to note that the antenna tuner provides both an on screen SWR digital measurement as well as power output digital measurement.

One nice surprise built into the tuner is the memory capability offered. The tuner automatically remembers the tuning adjustment it made the last time you used the rig on each band. Yep, if you don't change antennas you can easily move from one band to the other without having to crankup the tuner again to match the antenna. I can remember the days when having an automatic tuner to adjust to each band once you changed frequencies was enough. Now the process is remembered for each band. If you should change antennas for a particular band and forget to tell the tuner, it will provide a high SWR indication. The tuner was found to be very quick to provide a match to an antenna. "You don't want to write a review on an FT-767GX - where's my income tax check?"

Dimensions

This rig is small but you "ain't" going to get all these features without having to pay in the weight department. It is 368

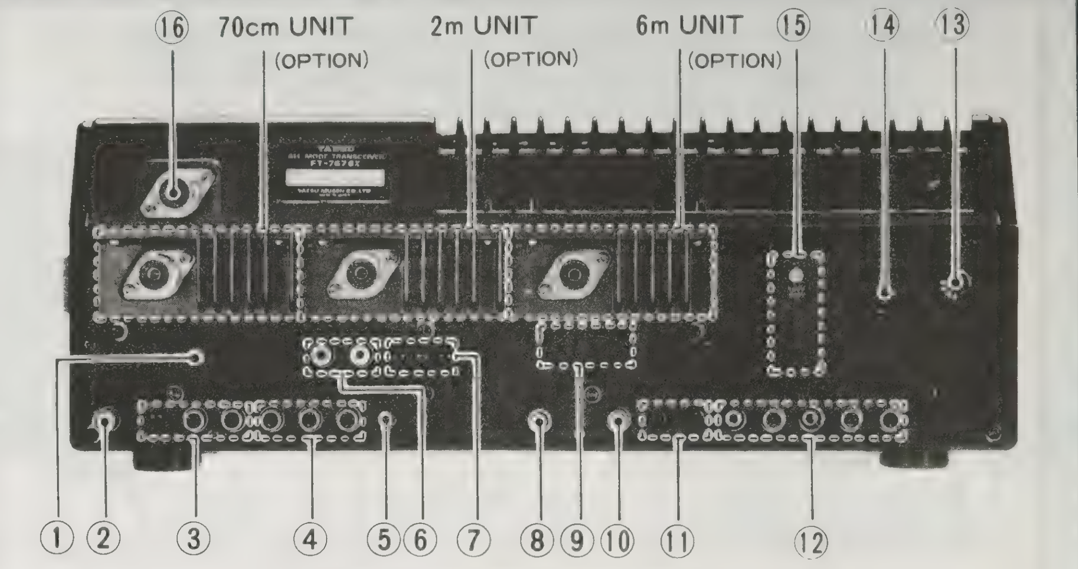


Fig. 2 Rear Panel Connections

mm (14.5 in.)wide, 129 mm (5 in.) high, and 295 mm (11.5 in.) deep. It weighs over 30 pounds without the options. The built in AC power supply helps make up a lot of the weight. Hence, you don't want to lug it around a lot. Power consumption is 55 volt amps on receive and 650 volt amps on transmit. Let's take a minute and look at its internal construction. Remember the old saying "Like a brick %#$% house." I like to have never gotten into it to make the mod for "all" frequency coverage. The enclosure has a lot of metal support for the circuit boards as well as structure support. Wiring is through harnesses and contacts, etc. and are of high quality. You won't find any audio wires in an FT-767GX. It is put together on a tray type principle with sections isolated by metal. If you got to go into it, keep notes. I'm not gripping about its structure design. It is just "very" well and tightly put together. Hope Yaesu can figure out where the one little screw I had left over goes back, I never did. The design is built for someone who wants to carry it around a lot. Save yourself some time before looking - the manual contains no instructions on getting inside the enclosure.

The internal design has excellent heat sink qualities. Also after long transmissions, the internal fan cuts on in the unit and very quickly cools its heat sink. We noticed the unit remaining fairly cool under some pretty long RTTY key down transmissions.

CAT System

The CAT System (sounds neat don't it) stands for the Computer-Aided Tuning system. The FT-767GX manual offers a pretty extensive explanation of what the CAT system does for you. Basically, it provides the capability to control the FT-767GX VFO and memory entry, selection and frequency tuning as well as IF shift and CTCSS tone selection by an external terminal or computer. The interface is through a bi-directional serial port which operates at 4800 baud. Five byte long data blocks are used for commands. The CAT interface provides an automatic echo of the command sent to it immediately after receiving a command. This allows you to be able to program software error checking to insure what you sent was received. You re-send the same command until you get it echoed back. Once the FT-767GX echoes back the right command, then your computer is expected to send a 5 byte ACK block for further verification. No time limits are imposed upon this sequence.

Also provided through the CAT system is a PTT line as well as an analog indication (0 to 4 volts) representing the signal strength of the received signal. TTL level output is provided for each band selected for an external linear amplifier.

Further commands that are allowed are as follows:

CHECK- Return current status
UP10HZ - up vfo frequency 10 hz
DN10HZ - down vfo frequency 10 hz
PROG UP- step size up
PROG DN- step size down
BAND UP- step up one ham band or .5 Mhz increment if in geneal band
BAND DN- step down (same as band up)
FREQ SET- set actual freqency value
VFOMR - VFO or memory selection
MEMSEL- memory select
MODESEL- mode select
HGSEL - ham or general band coverage
SPLIT TOG - toggles split frequency capability on or off
CLAR TO- toggles clarifier on or off
MTOV- move contents of memory to vfo
VTOM-move contents of vfo to memory
SWAP- Swap vfo and memory
ACLR- Turn off split, clarifier, or offset
TONE SET- set tone frequency

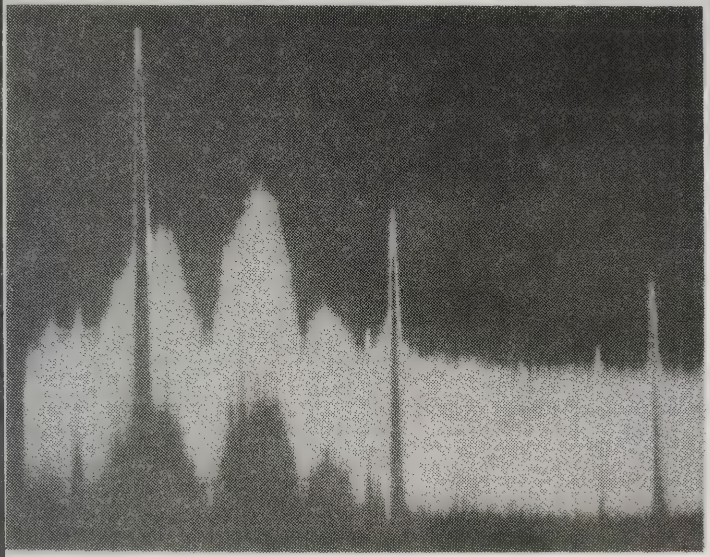


Fig. 3 With CW output at 7.2 MHz 110 Watt output

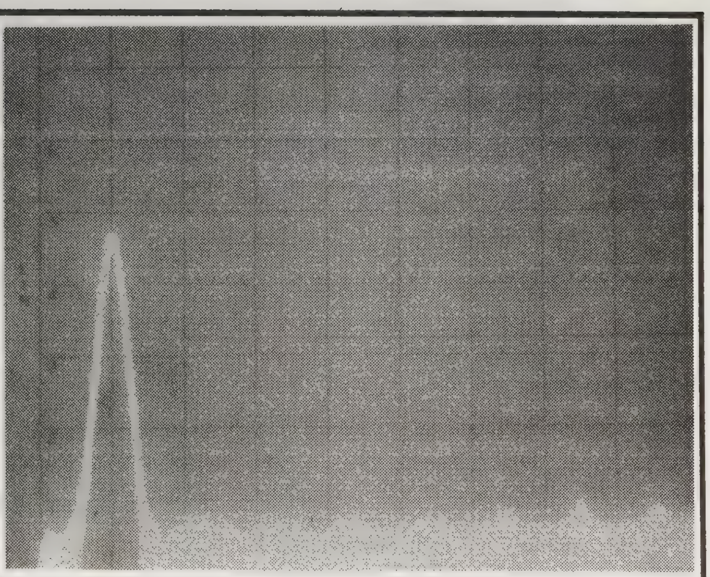


Fig. 4 Output set at 110 Watts 20KHz/division scan width

You can really see the programming power afforded in such an interface. No complicated control signals are needed. Just terminal RS-232 output to the FT-767GX input and the FT-767GX output to the terminal's input is needed. The terminal could be your home computer with a communications program running at 4800 baud.

Do not buy the FT-767GX thinking this software protocol can be easily programmed. We're talking about coding in op code instructions as well as binary code decimal parameters for the frequency data input. I have noticed that there are several programs available which directly work for the FT-767GX and provide an interface which means you only have to push a button. Look at the computer you have and check the ads for a program for the FT-767GX that matches your computer. It will save you a lot of heartache in programing.

CW Operation

The FT-767GX sports complete QSK operation with switching speeds fast enough to handle AMTOR as well as Packet high speed duty. A standard 600 Hz filter is included for notching onto CW signals in crowded band conditions. An iambic keyer with front panel speed and audio pitch control is included. The audio pitch control can be set for 600, 700, or 800 Hz cw operation. A "full break-in" switch allows complete QSK operation. A front panel control is provided to allow for adjustment of the filter passband during CW operation to further enhance CW reception.

FM Operation

FM operation affords a FM discriminator center tuning meter. You can purchase an optional subaudible Tone Squelch Unit as well as a Burst Tone Generator to

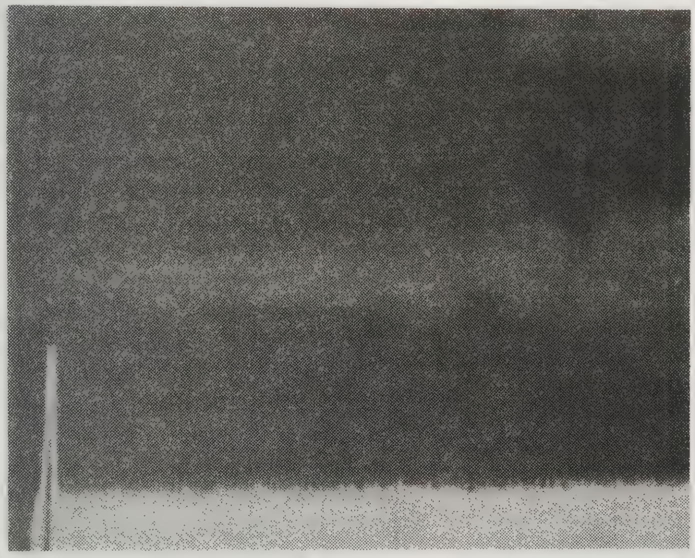


Fig. 5 6 meter test

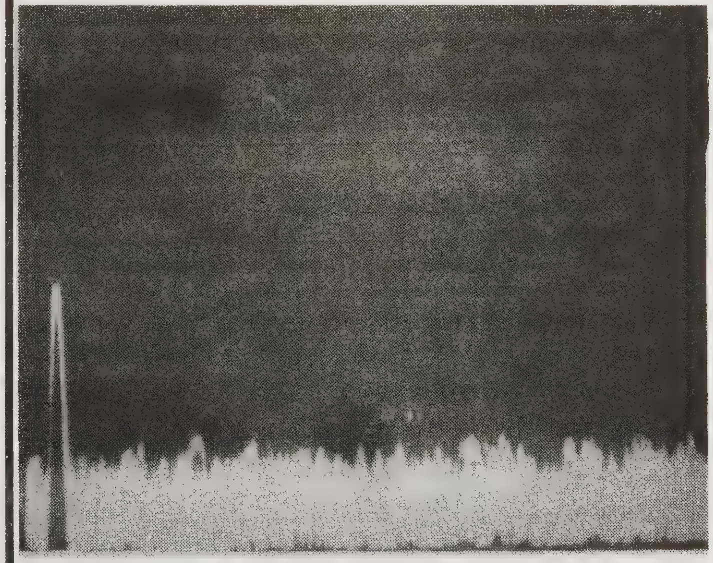


Fig. 6 2 meter output analysis

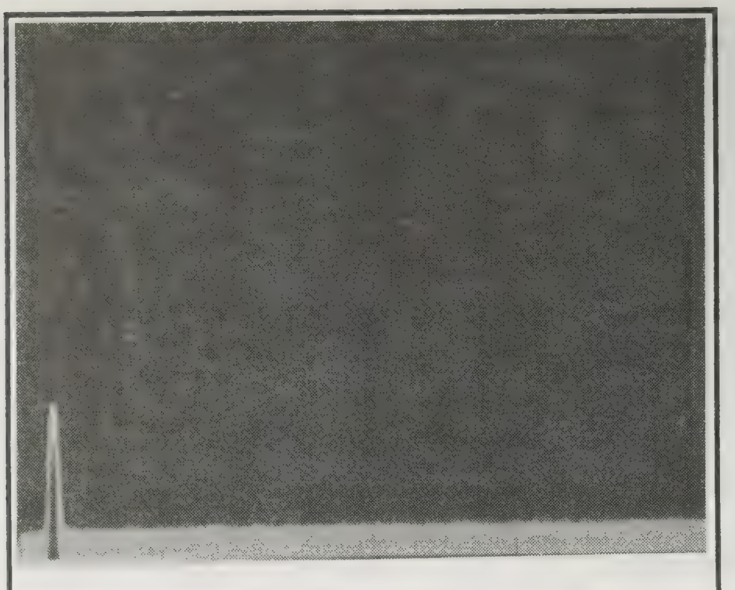


Fig. 7 70cm module

be used in the FT-767GX.

Operator Interface

Please refer to Figure 1 for a review of the front panel operator interface.

1. Power on and off switch

2. MOX - Manual PTT control

3. Microphone jack that also allows a mike to be connected which features frequency scanning capability.

4. Phones jack

5. Microphone and output power drive concentric knobs which provide control of the RF output level as well as the microphone audio level.

6. Squelch, which works in all modes, and noise blanker control. We noticed limited success in using this control to blanket the woodpecker interference.

7. Audio and radio frequency control for audio output.

8. Nine pushbutton switches which provide: VOX control; QSK operation; speech processor control; monitor transmission switch; transmit offset control; tone burst control; enables either a AM 2.7 Khz filter or a CW 600 Hz filter; RF amplifier to increase receiver sensitivity; attentuator control to provide 20 db attenuation.

9. More pushbuttons which allow the following controls; Dial lock and LED indication; Mute control for putting the receiver in standby; Noise blanker control; audio peak filter switch; notch filter control. One nice feature here is the ability to see a LED indication of the whether or not the dial lock capability is activated. On most other rigs this is just a pushbutton that makes you turn the knob to make sure it is pushed in.

10. Main tuning knob which increase frequency tuning which depends on a "fast" button to determine if tuning is accomplished in 10 Hz or 1 Khz steps.

11. Pushbuttons which allow automatic stepped changing of the tuned frequency depending on the mode of operation.

12. Receiver audio tone selection as well as control of the receiver IF passband below or above interference.

13. Allows rapid band or memory channel selection.

14. Notch filter adjustment as well as control of the audio peak filter for cw reception.

15. Three pushbuttons which allow the main tuning knob tuning to be faster, selection of the step size of the up and down keys on the optional scanning microphone, and the switch to turn the internal CW keyer on or off.

16. Pitch and speed control for internal CW keyer

17. Function keypad which serves dual function as a keyboard numeric input as well as various functions selection. The FT767-GX offers a keypad which serves two functions depending on the position of one pushbutton - the **Function key**. Hence, you can enter both numeric input for a frequency selection as well as choose a particular function using the same key. Beware, this is a very confusing operator interface feature. First, although most of the special functions offer an on screen indication of their selection, all of them do not. There is no positive indication whether you are in the numeric mode with the button you are pushing or in the special function selection. After a while we got use to this but it takes a while before you trust what you are doing. Often I pushed the button before pushing the function key or vice versa and things became quite interesting. It is just an interface which you have to get use to using. Once you did, it became quite easy. Audible indication of the function key being set would help.

Alternate functions available through this dual inputs assortment of keys are : tracking of both vfos; programmable memory scan between two frequencies set in memory; scan initialization between vfo, memory channels, or scan between adjacent memories; memory to vfo frequency selection and vice versa; selection of vfo or memory; memory recall; split frequency operation; selection of ham bands and general coverage; clearing of clarifier or frequency offsets; clarifier on or off; display of memory channels without selecting or bothering the frequency you are on; and offset frequency. I was disappointed when I couldn't find the button to wake me up in the morning.

18. Antenna tuner

19. These are digital SWR and RF power pushbuttons which change the front panel tuning display to show these functions. Please refer to Figure 2 for the format of the display used to show all the various functions as well as the tuner features.

20. Mode selection

21. Display as shown in Fig-

ure 2.

22. LEDs which show when the following features are active - CAT, HF attenuator, vfo tracking, and general coverage.

23. On air and busy frequency LED indication.

24. Multimeter which shows signal strength, FM discriminator center tuning, power output, final transistor current, transmitter automatic level control, speech processor compression level, and power supply voltage.

25. Knob controls for vox, speech processor, monitor volume, transmit shift, agc selection (fast, medium, or slow), meter and display brightness control.

26. Meter parameter selection.

Back Panel

If you think the front panel was mind bending you ought to see the back. Please refer to Figure 3 for this information

1. Pushbutton to engage or disengage lithium battery backup.
2. Ground post.
3. Seperate receive antenna input as well as switches to control antenna usage versus the main HF antenna connection.
4. RF output, external ALC for a linear, and relay for operation of linears etc.
5. Power output adjustment.
6. DC output of 13.5 volts at 200 mA and 8 volts output at 100 mA.
7. Crystal calibrator as well as switch which tells the FT-767GX that the linear amplifier connected can operate in a QSK mode.
8. CW key jack.
9. Band data and CAT jacks
10. PTT jack.
11. VOX delay and antitrip controls
12. External speaker output, 100mv audio source, plug for packet direct connection to the VHF or UHF radio for the microphone input, PTT, audio output, phone patch output, and 8 volt output for FSK operation.
13. Fuse
14. AC input
15. AC range selection
16. Main antenna (HF) connector.

Note: Notice the optional 70cm, 2mtr, and 6m modules are shown installed. These are installed in a manner of seconds by sliding the unit into its assigned slot and the unit's edge connector into a matching female connector inside the FT-767GX. Two screws have to be used to insure the module doesn't slide back out.

Test Results

A test bench scenario was setup using a 8553B Hewlett Packard spectrum analyzer along with an 8443A tracking generator as well as an 8552B IF section. We used a sniffer probe near the dummy load instead of a direct connection which means the addition of some distortion to our analysis.

The unit was measured to put out 110 watts on 7.2Mhz. It should be noted we always measured on an external wattmeter and the FT-767GX watt meter the exact same power output. When we looked at the digital wattmeter provided we sometimes saw different results. Under each testing scenario the antenna tuner was used to insure the output impedence was matched to the dummy load. At one point we saw both our own Bird wattmeter and the FT-767GX wattmeter show 110 watts output but the RF digital wattmeter only showed 95 watts. We measured the first harmonic to be 30 db down at 14.4 Mhz and the second to be 35 db down at 21.6 Mhz. The spectrum analyzer had a 3Khz bandwidth with a 10 db/division scale and 2 Mhz per division horizontal scale. *The grunge you see from the scope picture is interference within our test area and not due to the FT-767GX.* Figure 4 shows the same output but the scan width is set at 20 Khz/division.

The 6 meter, 2 meter and 2 cm units were also tested. Figure 5 shows the 6 meter output at a 100 Khz bandwidth, 50 Mhz/division, and 10 db/division vertical scale. The same spectrum analyzer parameters were set for each of these positions. Power output was measure to be 15 watts maximum. Figure 6 displays the measurements taken on 2 meters. We measured the RF power output to be 17 watts. Figure 7 displays the results of the 70 cm module.

Although the HF tests showed the Yausu FT-767GX to be borderline on meeting emission purity test, you've got to remember we were using an RF sniffer probe instead of tapping directly into the dummy load. We feel that if a better test environment could have been created, it would have further showed the FT-767GX to well meet emission guidelines.

Overall Rating

Could we recommend the FT-767GX rig. Yes, we could for several reasons.

First: You can work any frequency almost anyway you could without having to worry about another operator interface or quality of the signal you were putting out.

Second: Once you understood all the bells and whistles and how to deal with them, you have a radio that should add many years of enjoyment and allow you to operate any new mode or frequency which becomes available. It is very nice with the push of one button be able to flip from one radio port to the other.

Third: It is one very nicely built radio. Construction design is excellent.

If we were to not recommend the rig we would do so for a couple of reasons. Although the FT-767GX provides the capability to work many frequencies, you cannot work several of them at once. How many of you leave your two meter on while working RTTY. Hence, having seperate radios does provide a nice service. Second, the quality is there but also is a pretty steep price tag. You must make that judgement.

Jim S. Griffith, WA5FAX
104 Ladywood Lane
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By Robert S. Hoover, KA6HZF

How To Desolder

How to do it *my* way when all else fails!

This was written as an addendum to Part 3 of the C-64 conversion manual. I found a lot of people were not familiar with removing components from circuit boards, or that my language -- PTH for plated- through hole -- caused confusion. If you`re a technician you can ignore this and not miss a thing. Then again, you might get a laugh out of it; you won`t find my desoldering techniques in any text book. And if you are a technician, I wouldn`t mind hearing about *your* favorite desoldering technique; as you`ll see below, I need all the help I can get.

***

I`m a very backwards fellow. Given a gaggle of students to be trained for a NASA soldering certificate I always started with a box of old circuit boards. Lying like a trooper, I`d tell the students an important job called for some circuit boards to be modified; the boards were needed immediately and as we were short of man-power, the job had fallen to us. I promised to fit in their certification tests somehow, then put them to work *desoldering*.

No student ever questioned the abrupt change of schedule; such make-do management is more the rule than the exception in the military. A few turned green at the prospect of working on 'real' boards, worried about their abilities and fearing the consequences of failure. But I`d coax them along and in a few hours... or a few days(!) they were desoldering like old pros. There really isn`t much to learn; with the right tools it`s fairly easy.

Use whatever works to grab the thing. . . except your teeth.

And after learning to ***de***solder properly, passing that particular NASA cert for soldering (there are several) was a breeze!

Desoldering

To 'desolder a component' means to remove it from the circuit board without damaging the board *in any way*. To 'desolder a PTH (plated-through-hole)' means to clear the hole of solder. Desoldering is usually a destructive process; whatever was in the hole can`t be used again. However, there are times when you **must** use the thing again, as in one leg of a coil. In those cases the proper language is to '**lift**' the leg... and then to desolder the hole; the language can be rather confusing. The distinction is that when you 'desolder' you actually **remove** some or all of the solder; when you **lift** something, you only melt the solder.

Use A Two-Step Approach

The best way to 'desolder a component' is to go at it in two steps. The first is to cut the component clear of the board. If it`s something fairly massive like the block rectifier in the C-64, you`ll need a large pair of dykes to break it up. The object is to remove the component but leave the wires or pins in the board. Now you can remove them by heating and pulling them out with needle-nosed pliers, forceps or hemostats. Grab it with anything that works but don`t use your teeth. Removing the wire or pin usually leaves the PTH blocked with solder but it`s

The best solder-suckers are **big ones,** but soda straws are out.

okay, because we take care of that in the second step.

Clearing The Hole

To 'desolder a PTH' means to remove the solder from the hole so we can install a new component or a socket or... something else, like the wires in the C-64 conversion. The odd thing about desoldering a PTH is that you begin by **adding** solder to it! That`s right; flow more solder onto the PTH (don`t over do it; a dab is plenty). The object is to insure we can heat the solder plug uniformly down through the depth of the board. After removing a component there often isn`t enough solder remaining in the hole to conduct heat evenly.

Solder Suckers I Have Known

Having flowed on additional solder and raised the solder pool to a uniform, fluid temperature, we then use a solder sucker. The best *manual* solder-sucker is a *big one*. (There are powered solder-suckers but I won`t cover them here.) The bigger the sucker the more powerful it is and the less often it needs to be cleaned. You can do useful work with small solder-suckers but when clearing more than a few holes you should be using the right tool, which would be a larger sucker. For this job you only need to clear a few holes; use whatever you have but soda straws are out.

There are two basic ways to use a solder-sucker; you can alternately heat and suck from the same side of the board or you can heat from one side and suck from the other. This last method seems to work best but calls for some means of holding the board in order to work on it. For the C-64 conversion, standing the board on edge using a few books to brace it from both sides works just fine.

Position the sucker over the hole on one side of the board while heating from the other. Experience is the only thing that tells you precisely **when** to suck it up, but if you clear the hole, you did it correctly.

Often times the solder sucker doesn`t clear the hole completely. You can *add more solder* and try again but it`s largely a judgment call. If you see light through the hole a second attempt will usually be wasted effort. The best bet is to try and soak up the remainder with solder wick; in some cases, solder wick works better than a solder sucker -- once again, it`s a judgment call.

There are only two rules to this game: never overheat the board -- you`ll destroy the glue that holds the copper laminate to the substrate, ie, you`ll lift the traces. And never use force. Forget drills and reamers and all the rest of it; use your head instead.

Solder Wick

Solder wick is great stuff but it`s only another tool in your war bag, not the Ultimate Answer to desoldering. Used improperly, solder wick tends to overheat the board. Solder wick works not because of the fine braid of the wick but because of the powdered resin the wick is loaded with. If you leave your solder wick to knock around the bench it will lose its resin, the surface of the braid will oxidize, and no amount of heat will cause it to take up solder.

I`ve no idea when solder wick first became available as a commercial product but thirty years ago we were using the braid from a scrap of coax, dipped in liquid resin, to do the same thing. It worked like Gang Busters... and still does, when you don`t have a roll of solder wick handy. Of course, it`s messy as the devil but you can always wash the excess resin off the board when you`re done.

Emergency Repairs

Desoldering is slightly more difficult -- and infinitely more time consuming -- than soldering, but equally important in the real world of electronics. There may come a time when you`ll find it necessary to remove a soldered-in chip by the light of a gasoline lantern while hunkered under a tarp in a pouring rain. In a situation like that the best repair is often the fastest one with any delay measured in lost lives.

In the case above you probably wouldn`t desolder at all, just cut away the bad chip and piggy-back a replacement to the stubs of its legs, a valid repair procedure under emergency or combat conditions. There is no University of Emergency Repairs, it`s up to the man on the scene to do the best he can. But without a sound schooling in the basics there`s little hope you`ll be able to extemporize repairs successfully.

The most important tool in your kit, and the *only* tool you`ll always have with you, is what you ***know***. This article is intended to describe a few basic skills on desoldering. How well you learn those skills will be up to you. If you`re a complete novice to both soldering and desoldering your best course is to provide yourself with some old circuit boards and the basic tools then practice desoldering until you can do it quickly and neatly, without damaging the boards. While learning to do the job correctly you`ll see other, sometimes faster but *incorrect* ways to do the same thing. And you`ll remember them -- and possibly use them one day when lives are threatened and you haven`t the luxury of time.

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Sinclair 2068 **By Ed Shaughnessy**

Calling Machine Language Routines from BASIC

This program was left out of the article in the January issue. Sure sorry about that. It hurts not only the author but me as well when I do something. They work so hard to give you quality articles and then I leave out important parts. Maybe one of these days I will do it right.

```
   1 REM Demonstration of CALLER subroutine.
   2 GO SUB 9050: REM Initialization
   5 REM
  15 REM Call the machine language routine PRT-STRING at location 8667 in ROM
  25 REM Print the string at address 15498 that is 30 bytes long.
  35 LET ADDRESS=8667: LET DE=15498: LET BC=30: PRINT : GO SUB 9030: PAUSE 0
  45 STOP
9000 REM ########## CALLER subroutine ##################################
9002 REM
9004 REM To call a machine language routine:
9006 REM  1) First set the value of ADDRESS to the address of the routine.
9008 REM  2) Then set the values of any single registers (A, B, C, etc.)
9010 REM     that you wish to specify before calling the routine.
9012 REM  3) Finally, do a GOSUB 9000
9014 REM
9016 REM (If you specify double registers such as BC, DE, or HL
9018 REM  then do a GOSUB 9030 instead of GOSUB 9000.)
9020 LET BC=(256*B)+C: LET DE=(256*D)+E: LET HL=(256*H)+L
9030 LET X=A+(BC+(DE+(HL+(ADDRESS+ USR 40000))))
9040 RETURN
9050 REM ########## Create ML code used by CALLER subroutine ########
9052 REM Poke into RAM the ML code starting at location 40,000.
9054 REM Initialize to zero all variables representing registers.
9060 LET CSUM=0
9070 FOR I=40000 TO 40041
9080 READ X: POKE I,X: LET CSUM=CSUM+X
9090 NEXT I
9100 DATA 42,101,92,229,33,96,156,229,205,96,49,197,205,96
9110 DATA 49,197,205,96,49,197,205,96,49,197,205,96,49,121
9120 DATA 193,209,225,201,225,34,101,92,225,229,34,62,156,201
9130 IF CSUM <> 5824 THEN  PRINT "Error in DATA statements": STOP
9140 LET A=0: LET B=0: LET C=0: LET D=0: LET E=0: LET H=0: LET L=0
9150 LET BC=0: LET DE=0: LET HL=0: RETURN
```

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By Tom Stovall, Jr., KB4DTF

Computer Graphics

Using the Commodore C+4 3 nice programs

The Commodore Plus Four just got better now that I am using the Okidata 120 dot matrix printer. It is compatible with the C+4 and C-64. A sample of it is the programs listed in this column. These programs are graphic oriented with some movement within the picture.

The programs are called **scanner**, **shortwave radio** and **packet radio**. I designed these for the 1986 BirmingHAMfest (Birmingham Amateur Radio Club). It was used in the video information service.

The scanner program will draw a scanner with the lights flashing as well as sound. The shortwave radio program draws a SWR rig and has noise similar to static. The final program, called Packet Radio draws the computer, monitor and packet radio interface. This program uses sound and word motion.

```
10 REM SCANNER BY TOM STOVALL
20 REM FOR CTM 1987
30 COLOR0,8,7:COLOR4,8,7:COLOR1,7,2:GRAPHIC0
40 GRAPHIC2,1:SCNCLR:FORW=1TO500:NEXTW
50 DRAW1,50,50TO250,50:DRAW1,250,50TO250,110
60 DRAW1,250,110TO50,110:DRAW1,50,110TO50,50
70 DRAW1,55,55TO245,55:DRAW1,245,55TO245,105
80 DRAW1,245,105TO55,105:DRAW1,55,105TO55,55
90 BOX1,62,63,72,72:BOX1,78,63,88,72
100 BOX1,94,63,104,72:BOX1,110,63,120,72
110 BOX1,126,63,136,72:BOX1,142,63,152,72
120 BOX1,158,63,168,72:BOX1,174,63,184,72
130 CIRCLE1,205,85,10:CIRCLE1,230,85,10
140 DRAW1,230,50TO230,30:DRAW1,222,50TO222,30:DRAW1,222,30TO230,30
150 DRAW1,229,30TO229,10:DRAW1,223,30TO223,10:DRAW1,223,30TO229,30
160 DRAW1,223,10TO226,3:DRAW1,229,10TO226,3:DRAW1,224,3TO228,3
170 DRAW1,224,3TO224,1:DRAW1,228,3TO228,1:DRAW1,224,1TO228,1
180 COLOR1,3,2:CHAR1,24,8,"VOL SQ"
190 COLOR1,5,2:CHAR1,9,12,"SCANNERS"
200 COLOR1,4,2:CHAR1,8,10,"1 2 3 4 5 6 7 8"
210 PAINT,51,66:PAINT,205,85:PAINT,230,85:FORQ=1TO10
220 CHAR1,8,8,"▒":VOL8:SOUND1,100,5:CHAR1,8,8," "
230 CHAR1,10,8,"▒":VOL8:SOUND1,200,5:CHAR1,10,8," "
240 CHAR1,12,8,"▒":VOL8:SOUND1,300,5:CHAR1,12,8," "
250 CHAR1,14,8,"▒":VOL8:SOUND1,400,5:CHAR1,14,8," "
260 CHAR1,16,8,"▒":VOL8:SOUND1,500,5:CHAR1,16,8," "
270 CHAR1,18,8,"▒":VOL8:SOUND1,600,5:CHAR1,18,8," "
280 CHAR1,20,8,"▒":VOL8:SOUND1,700,5:CHAR1,20,8," "
290 CHAR1,22,8,"▒":VOL8:SOUND1,800,5:CHAR1,22,8," "
    :NEXTQ:FORW=1TO500:NEXTW
READY.
```

```
10 REM PACKET RADIO BY TOM STOVALL
20 REM FOR CTM 1987
30 COLOR0,8,7:COLOR4,8,7:COLOR1,7,2
40 SCNCLR:GRAPHIC0:FORT=1TO500:NEXTT
50 GRAPHIC1,1:BOX1,20,80,145,120:BOX1,25,85,140,115
60 BOX1,150,47,250,100:BOX1,150,103,250,123
70 COLOR1,8,2:PAINT1,23,90:COLOR1,7,2
30 CHAR1,20,6," ╭──────────╮"
90 CHAR1,20,7,"│          │"
100 CHAR1,20,8,"│          │"
110 CHAR1,20,9,"│          │"
120 CHAR1,20,10,"│          │"
130 CHAR1,20,11," ╰──────────╯"
140 DRAW1,30,120TO30,124:DRAW1,140,120TO140,124
150 FORR=1TO19:READD:BOX1,D,105,D,108:BOX1,D,110,D,113:NEXTR:COLOR1,7,2
160 DATA155,160,165,170,175,180,185,190,195,200,205,210,215,220,225,230,
    235,240, 245
170 CIRCLE1,100,100,4:CIRCLE1,120,100,4
180 DRAW1,30,100TO90,100:DRAW1,90,100TO90,105:DRAW1,90,105TO30,105
190 DRAW1,30,105TO30,100:DRAW1,40,100TO40,105:DRAW1,50,100TO50,105
200 DRAW1,60,105TO60,100:DRAW1,70,100TO70,105:DRAW1,80,100TO80,105
    :COLOR1,3,5
210 CHAR1,5,11,"BAUD   ASCII":PAINT1,155,75:COLOR1,7,2
220 FORT=1TO250:NEXTT:COLOR1,8,2:FORP=1TO10
230 CHAR1,22,8,"P":VOL8:SOUND1,100,5:FORE=1TO25:NEXTE
240 CHAR1,22,8,"PA":VOL8:SOUND1,1000,5:FORE=1TO25:NEXTE
250 CHAR1,22,8,"PAC":VOL8:SOUND1,900,5:FORE=1TO25:NEXTE
260 CHAR1,22,8,"PACK":VOL8:SOUND1,800,5:FORE=1TO25:NEXTE
270 CHAR1,22,8,"PACKE":VOL8:SOUND1,700,5:FORE=1TO25:NEXTE
280 CHAR1,22,8,"PACKET":VOL8:SOUND1,600,5:FORE=1TO25:NEXTE
290 CHAR1,22,10,"R":VOL8:SOUND1,500,5
300 CHAR1,22,10,"RA":VOL8:SOUND1,400,5
310 CHAR1,22,10,"RAD":VOL8:SOUND1,300,5
320 CHAR1,22,10,"RADI":VOL8:SOUND1,200,1
330 CHAR1,22,10,"RADIO":VOL8:SOUND1,100,5
340 FORR=1TO150:NEXTR:CHAR1,22,8,"      ":CHAR1,22,10,"      ":NEXTP
350 FORQ=1TO500:NEXTQ:SCNCLR:GRAPHIC0:FORE=1TO500:NEXTE
READY.
```

```
10 REM SHORTWAVE RADIO BY TOM STOVALL
20 REM FOR CTM 1987
30 COLOR0,8,7:COLOR4,8,7:COLOR1,7,2
40 SCNCLR:GRAPHIC0
50 GRAPHIC2,1:DRAW1,50,50TO250,50:DRAW1,250,50TO250,150
60 DRAW1,250,150TO50,150:DRAW1,50,150TO50,50
70 DRAW1,60,60TO160,60:DRAW1,160,60TO160,120
80 DRAW1,160,120TO60,120:DRAW1,60,120TO60,60
90 CIRCLE1,75,135,5:CIRCLE1,110,135,5:CIRCLE1,145,135,5
100 CIRCLE1,215,80,20,15,272,90
110 DRAW1,195,80TO235,80:DRAW1,220,80TO205,75
120 CIRCLE1,200,120,10:CIRCLE1,230,120,10
130 COLOR1,10,3:PAINT1,65,51:COLOR1,4,4:PAINT1,66,70
140 CHAR1,24,17,"VOL":CHAR1,28,17,"SQ":CHAR1,25,11,"METER"
150 CHAR1,11,5,"SHORT WAVE RADIO"
160 VOL8:FORT=1TO50:SOUND3,200,10:NEXTT
170 FORT=1TO500:NEXTT:SCNCLR:GRAPHIC0
READY.
```

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By Theo Turk, WB8ADA

Electronic Log

Another great use of a great little computer in the ham shack

The following is a "LOG" program for Amateur Radio purposes using the TS1000/1500 computer. With the available memory, approximately 450 separate entries, each containing 32 characters can be entered.

It is Menu driven with a list of 3 options.

The options include:

E - Enter/Examine data
R - Return
S - Save to tape

Running the program, the screen will display the Menu plus various options that are available.

1. Pressing "R" will return you to Basic and stop.

2. Pressing "S" will save the program and ALL entered data to tape. To restart the program after loading, type in "Rand Usr 16767".

3.Pressing "E" will enable you to examine and/or enter new or preceding data into memory. Type in a call as requested to access the system.

3A. The program then enters a Search mode. If unable to find a match, the first available memory location will be found to insert the new data. Type in the Name, QTH and Contact date as required. (Note 1) If a match does occur, the callsign will be displayed.

3B. Next, the program enters the Destroy mode. You then have the option to either (1) press "P" to exit if the displayed data is correct or (2)press any other key and then type in the corrected information if the data shown is in error. (Note 1)

The Op's name will be displayed next, followed by the QTH and last date of Contact. (Note 1, Paragraph 3B).

The last # printed on the screen after the date indicates the TOTAL Running count of contacts made, to date, for that particular station. If a correction is necessary in any one entry, the count will be automatically increased by one (1). Otherwise, it remains constant.

Note 1: Each of the 4 entries are set up for a maximum number of key closures. For example, the name is set for a limit of 6 letters. The QTH is set for 12 letters; 9 for city and 2 for state. (Note: a period (.) or comman (,) is permissable for separation. eg. N.Y.C. instead of New York City; eg. Miami, FL.). The date (May 17, 1986) is entered as 051786. This indicates the last contact with this station was on May 17, 1986. On any entry less than the set-limit press "Enter" to exit.

Note2: As soon as the amount of memory used for storage has become depleted, "Out of Memory" will be displayed.

Notes: Line 2 contains all of the messages that are printed.

Line 3 contains the subroutines such as Print, Pline, Key, Enter, Input and Errchk.

Line 4 is the actual start of the program.

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Write for details

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```
1 REM (followed by 580 X's)
2 LET A$="C372410002601263226392A3A37003726292E340031342C
    76767676761D002A33392A3700282631311B1B76021E002A3339
         2A37003326322A76031F002A33392A37003639 2D76042000 2A
    33392A37002926392A7605102A11002A33392A37182A3D26322E33
         2A761037110037 2A393A373376103811003826 3B2A7606343A
    3900342B00322A3234373E7607"
3 LET A$=A$+"2188407EB92320FB0C7EB9C8D72318F948545D1AD71310FB41C9
    CDBB023EFDBCC9C5D5E5CD294138FB444DCDBD077EF5CD294130FBF1
         E1D1C1C9322140CD3041FE76280ABA38F6BB30F377231 0EF78A7
    C836002310FBC9CD3041FE35C449413E76D7C9"
4 LET A$=A$+"3E1B2A104011060019227B4077CD2A0ACD2B0F06050E00
    CDF5080E05CD0F41CD3041FE2ACCAB41FE37C8FE3820DFCD230F118740
         CDFB0218D4CD2A0A06000E07CDF5080E01CD0F41060611401C
    213C40CD49412A104011060019228540ED4B1440A7ED423811CD2A0A
         060948CDF5080E06CD0F41C36F42097EFE1BCA7642113C400606
    1ABE28092A8540112000 1918CA132310EFCD2A0A06050E00CDF508
         AF3221402A85400606CD1F41D511401CCD6641E10606CD1F41
    D5114026CD6641E1060CCD1F41D511401ACD6641E1545D06030E02
         1AD7130D20FA0528053E18D718F0D50606112 61CCD6641E146
    234E3A2140A728040371 2B70CD2015CD550B01409CCD350FC9
         0E02CD0F41214240060611 4026CD49410E03CD0F41060C11401A
    214840CD49410E04CD0F4106061126 1C215440CD4941360023360 1
         3E1BED5B7B40213C4001 2000EDB012ED537B40C3C541"
```

TYPE IN. . .

```
5 LET A-16514
6 POKE A,16 XCODE A$ +
CODE A$(2) - 476
7 LET A=A+1
8 LET A$=A$=1
8 LET A$=A$(3 TO)
9 IF A$<>"" THEN GOTO 6
10 STOP
```

DELETE Lines 2 Thru 10 - Inclusive, then add. . .

```
10 DIM A$(14500)
20 LET A=USR 16514
30 STOP
```

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A Good One for PACKET

A Terminal Program That is

Its likely that some of you may have entered Packet Radio without ever having been involved with modems, terminal programs, file transfers, or telephone BBS's. If so, then not only was Packet new to you, but so was the idea of using a "terminal program" to interface the TNC, radio, and YOU to work together. This has resulted in many new "Packeteers" just using what ever software they got with the TNC, or using what ever they could find that would work. When you are just trying to get on the air, this is fine, but as you become more proficient in the use of packet radio techniques, the need for a more advanced terminal program quickly becomes desirable. Unfortunately, there are not many "Packet Software" programs available for you to choose from, and the ones that are may not have all the features to really make packet operation more flexible.

There seems to be several reasons that there isn't a big influx of packet software programs... its still a relatively new form of communication to most Hams, so the current software market is also relatively small... software development is costly and high cost programs don't sell well, software is hard to protect, and most of all, there are a lot of good programs designed for modem/landline use that work great with today's TNC's, so competion is already on the shelves before a new program is developed!. This brings us to... **VIP TERMINAL!**

VIP TERMINAL is well known to most computerists involved in telecommunications, and it has already established an excellent track record. The current edition of this program is called VIP TERMINAL XL and is available for the C64/C128 as well as for the IBM PC. It has the unusual combination of being one of the top rated terminal programs by most software reviewers, yet the price is a reasonable $40 (suggested retail). For those of you new to this program, lets take a look at the C64/C128 computer version, its features, and its capabilities for packet use. I think you will find it to be a first class program for our use, just as it is telecommunication use.

"Gee Whiz. . ."

Vip is a full featured machine language program with a barrel of features for the Packeteer. A list of some of the more important features are:

- A choice of 40, 64, 80, even 106 column display.
- 20 programmable keys (Super for pre-recorded packet messages!).
- Virtual memory disk access (Send files right from disk).
- Full screen editor for workspace (Write TFC for later use).
- Word wrap for neat formatted display.
- Works with most any printer.
- Auto buffer option for downloading programs/files (See who called or what has gone on while you were out).
- Built in clock display and alarm (Reminds you of net time or to go pick up the kids).
- Baud rates of 300 to 2400
- Receive/Send BASIC/ Machine Language-Programs or Sequential files.
- And more...

You really can't appreciate all the features available with VIP just by reading about them, but they become most apparent when you begin operatingon packet, and that's the key... making your operation easier and flexible! The "terminal" program was designed to be one program of an integrated "Library" of VIP software. To load it, you load "Desktop" and you are presented with a choice of VIP Finance, VIP Calc, VIP Database, VIP Graph, etc... Each of these programs is purchased seperately, so for our use we select the only program actually on our disk, VIP TERMINAL. Once loaded, the first screen you will see displays the "Time Options". You enter the date, time, set the alarm, and select the various options to activate the alarm and display the clock, all as desired. If you wish, the clock cana be displayed in the upper right corner of the screen while you operate packet.

"Options. . ."

After this is done, you are ready to select other options by using one of 9 menues of the program. You can get to them using the 8 Function Keys. (The 9th key is to RESTORE key, which gets you out of the program). VIP also offers you the option to use icons (pictures) to make your menu selections. You can use the keyboard, or a joystick controller to move a "pointing hand" to certain icons to make your selections. If you prefer to not use icons, they can be turned off and you can just press one of the 8 function keys to get faster operations. The icons are fine while you are trying to get the handle on all the new features, but for packet work, it takes a little more time to move the "hand" around than to just press F3 or F7 to get where you want to go. The Option Menus that you can select include:

(F1) HELP MENU - Gives you help for most any question you have about using VIP.
(F2) OPTIONS - Lets you select screen colors, number of characters per line, terminal prarameters, and more.
(F3) TALK - This is the operating screen on packet. you send/receive from here, to include the transmission of files. It has its own little help screen available by pressing META/H.
(F4) TIME - The screen that gives you date/time options.
(F5) PRINT - This menu lets you set up various printer options.
(F6) KEYS - Offers you the option of programming 20 keys to send short messages on command.
(F7) FILE - The File menu lets you view, edit, save, load, and print files, programmed keys, and a large workspace. It also offers other options such as renaming or scratching files, and the saving of "environment" disks. These environment disks let you save all the options you have set to include character displays, colors, and formats.
(F8) TELEPHONE # - This is used to record numbers and has autodial features that are used with telephone modems.
(RESTORE) - This allows you to exit the program to BASIC or to the Desktop menu.

Well, that's a run down on the features of the program, but let me give you an idea of how it can work at your QTH by giving you a "demo" of typical session at my shack.

"***CONNECTED..."

After loading the VIP TERMINAL into the 1571 disk drive of the C-128, I wait for the TIME screen to appear so I can enter the current date and time. I set the alarm for 45 minutes from now (to insure I remember the local ARES net), activate the quarter hour chimne and the alarm feature. Then I press **F7** to get to the FILE menu. In this menu, I move the cursor to select **LOAD ENVIRONMENT,** replace the program disk with my PACKET ENVIRONMENT disk, then press **(RETURN)**. This packet environment disk is one that I have previouslyi saved with all my special likes and formats. I use an amber monitor, so I have this disk programmed to display a black screen with bright amber letters. I want the clock displayed most of the time, so its programmed to come on automatically. It also has the "audible key click" feature turned off, it contains several prerecorded packet messages and commands, and has the printer set up for use at any time.

At this time, I decide that I need to send a message to the Gulfport and to Atlanta, so I type up the message to the Coast and svae it to disk. I then clear the workspace and type the message to Atlanta saving it to disk and again clear the workspace. So much for all my prerecorded messages!

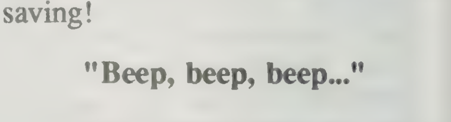
By pressing **F3,** I go to the main work screen and I am ready to start my packet work. After checking into one of the local BBS's I can post the messages for the Gulf Coast and Atlanta at the touch of a key. Should I see something I want to keep, I can 'open the workpace' to hold all that comes into the TNC. By opening this space and activating the Connect Message in the TNC, other Hams can leave you notes, messages, or even files while you aren't home!

In addition to the disk files and the workspace that hold messages, there is a function key called KEYS that lets you access 20 preprogrammed messages of up to 128 characters each instantly from the operation screen. Ten of these are accessed by **(CONTROL)** 1 thru 0, and the other ten are accessed by (C=) 1 thru 0. Now a 128 character message isn't very large, but you can do a lot with these little notes. Fore example, I use the **(CONTROL)** 1 thru 0 keys for CONNECT paths through DIGIs to BBS or often used multiple path hops. (C), 1 prints **"C KF5IZ VIA JAN"**...(C),2 prints (C **WB5SXK VIA JAN, VKS"...** these two paths being local BBSs that I check often. The other ten keys hold station info and often sent items such as (C=),1 prints **" HI OM..NAME HR IS BOB..QTH JACKSON, MS ON THE RESERVOIR"...** (C=)2 prints **"RIG HR IS SANTEC HT/30 WATT AMP..C-128/1571 AND MFJ-1270.. ANT IS DISCONE.."** Of course these short messages can be put end to end to make longer messages as needed. To actually transmit the message you call up, just press **(ENTER).** It is really neat for packet work and very time saving!

"Beep, beep, beep..."

The features of VIP go on and on... you can "toggle" the clock display ON/OFF, dump to the printer, save directly to or transmit from disk, scratch files, rename files, format a new data disk, etc... In short, if you need an excellent program for packet work, consider **VIP TERMINAL.** I don't think you will be disappointed. Well, I have to go... VIP's alarm just went off... got to check into the net! CWUL..73.

Robert W.P. Patterson,
K5DZE
410 Millrun Road
Brandon, MS 39042 **CTM**



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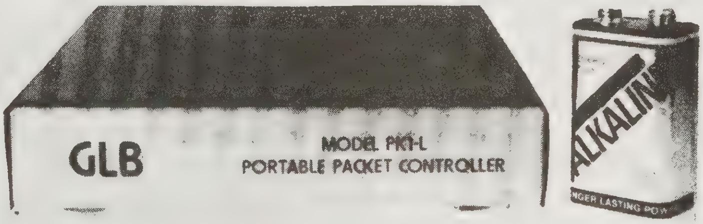

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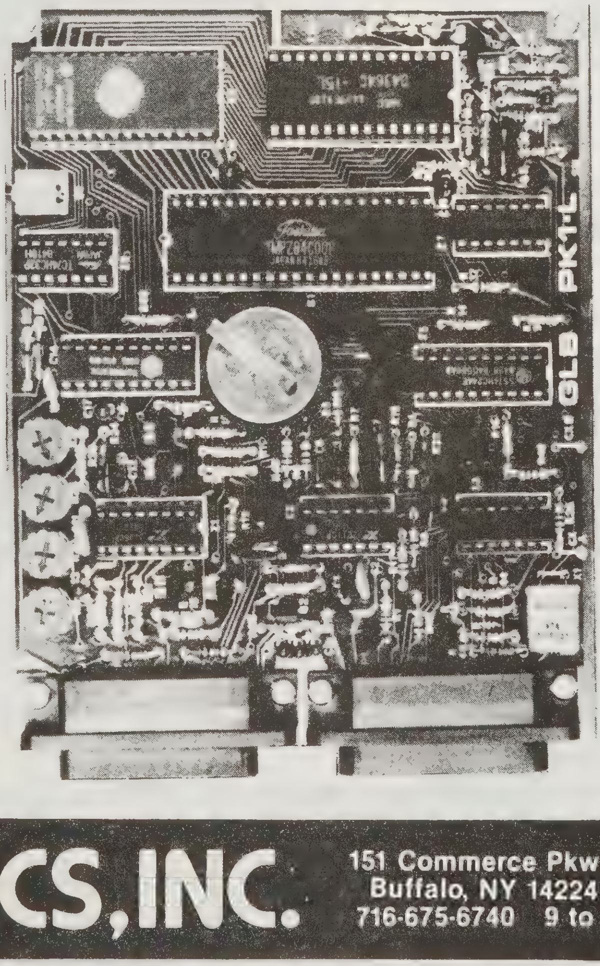

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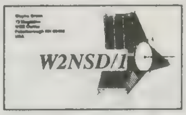

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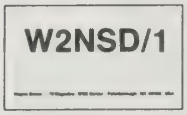
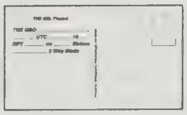


Reverse



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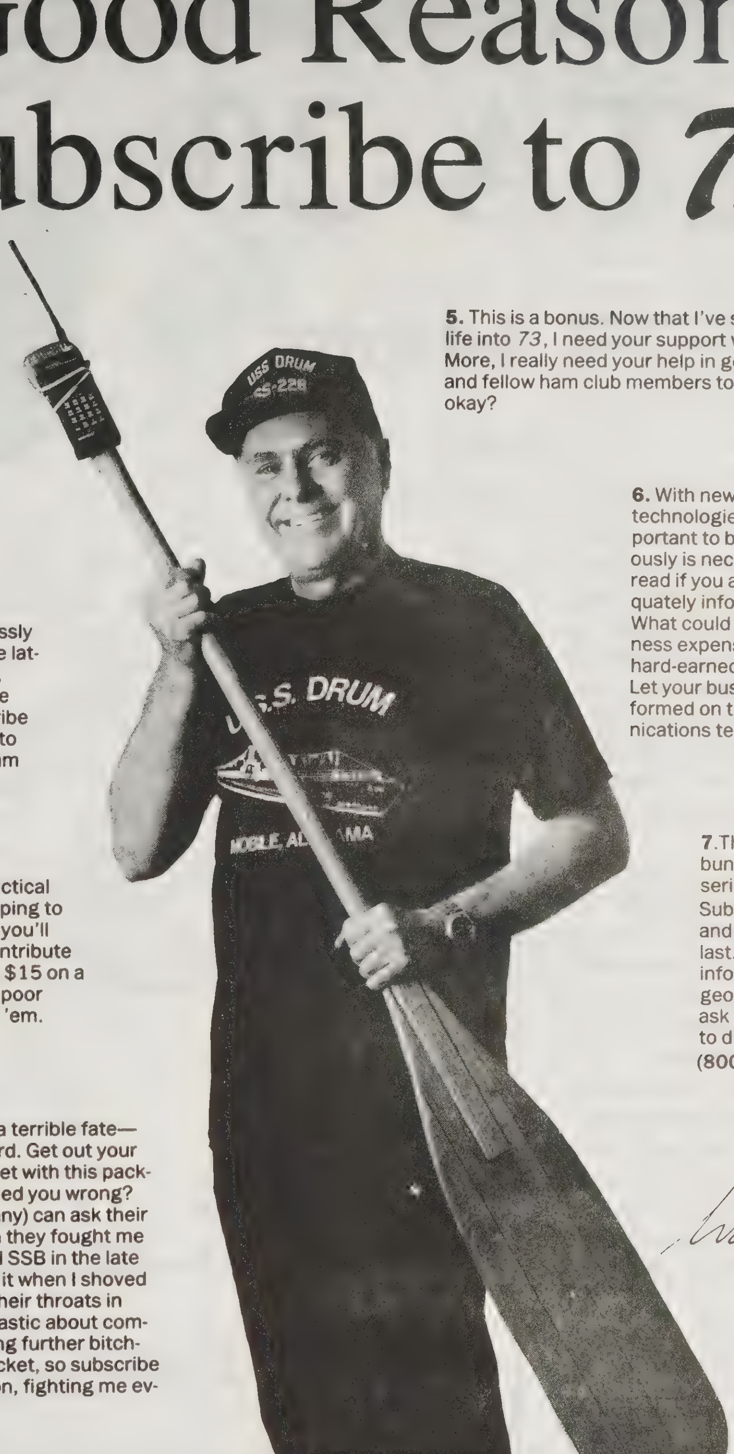

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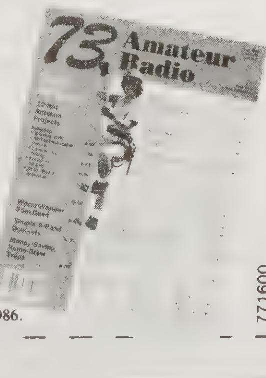

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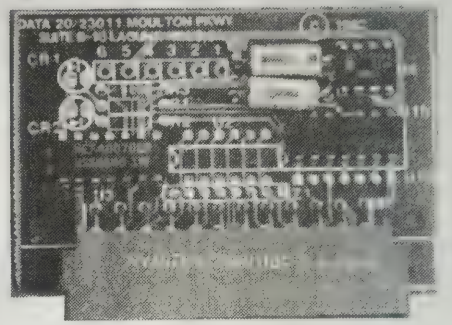
A Review

By Robert S. Hoover, KA6HZF

DATA-20



RS-232 Adaptor

It work with the Battery-Powered C-64

In a recent series of articles "The Portable Pakratt™ published in **CTM** I described how to convert your Commodore C-64 to operate from a car battery. The purpose of conversion was to allow the AEA PK-64 Pakratt™ TNC to be used for power-line independent service, such as emergency communication.

The AEA PK-64 is not a TAPR clone and it should not be viewed as an accessory to the C-64. When the two are connected via the Memory Expansion Port, they become an integral system dedicated to communications.

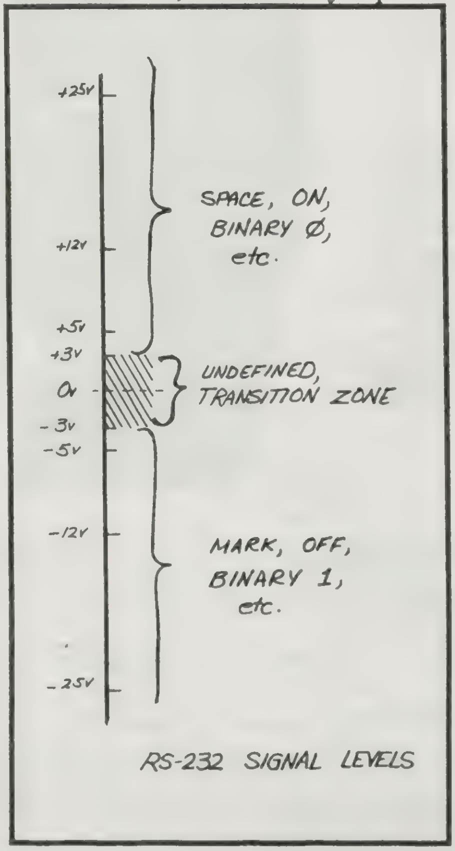
Dedicated systems such as this are a tremendous boon to the emergency communicator because they are easier to bring on line and much simpler to use. There is no confusion over RS-232 interfacing, nor the need for separate terminal control programs.

Because the PK-64 does not use the RS-232 port, I made no provision to support it when it when I designed the battery conversion for the C-64. And therein lies a problem.

TAPR Clones and the C-64

Virtually all over TNC's speak to their terminals via an RS-232 port; if you want to play Packet, you must first play RS-232. The Commodore C-64 does not have a true RS-232 port but a TTL-level 'pseudo RS-232' that may be accessed via the User Port. It's necessary to use an adaptor of some sort to convert the TTL signal voltages into RS-232 signal voltages; such adaptors are commonly available and anyone using a TAPR clone with the C-64 is presently using one.

The signal levels for RS-232 are quite wide, Figure 1 will give you some idea of what I mean. Originally intended to provide communications in relatively noisy environments, electrically speaking, some units have swings of as much as ± 50 volts, although ± volts is the norm for most computer equipment.


+25v
+12v
+5v
+3v
0v
-3v
-5v
-12v
-25v
SPACE, ON, BINARY 0, etc.
UNDEFINED, TRANSITION ZONE
MARK, OFF, BINARY 1, etc.

RS-232 SIGNAL LEVELS

Most RS-232 adaptors used with the C-64 use the 0vac available at the User Port to generate the necessary plus and minus voltages. And that's the rub: When the C-64 is running on battery power, the 9vac buss is dead. RS-232 adaptors which need the 9vac line won't work, and you find yourself unable to use your TNC.

An Easy Cure for the Problem

Having designed the 12v conversion to support the AEA PK-64, I'd never given any thought to operating other TNC's on battery power. Many people went ahead with the conversion and then found their TNC's would not work, certainly a frustrating experience.

There are a number of simple solutions to the problem but the most convenient and least expensive method is to use an RS-232 interface which **does not use the 9vac buss.** The Mid-Tek **DATA-20** as shown in Figure 2 is one such device.

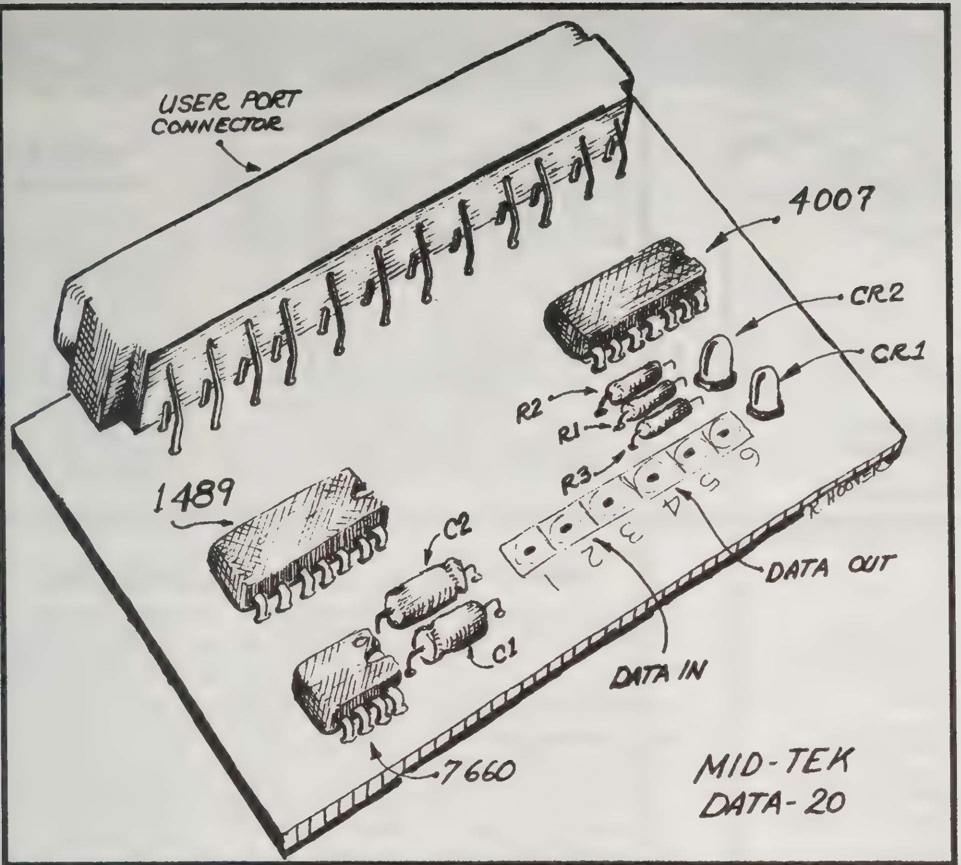
Unlike most other RS-232 adaptors, the **DATA-20** uses a swing of ± 5v. This is well within spec for RS-232 and works reliably so long as your cable runs are under short -- less than fifty feet or so --and your environment isn't too noisy. The negative voltage is generated on-board the interface card from the +5v buss; the 9vac buss is not required, it isn't even brought out to the card.

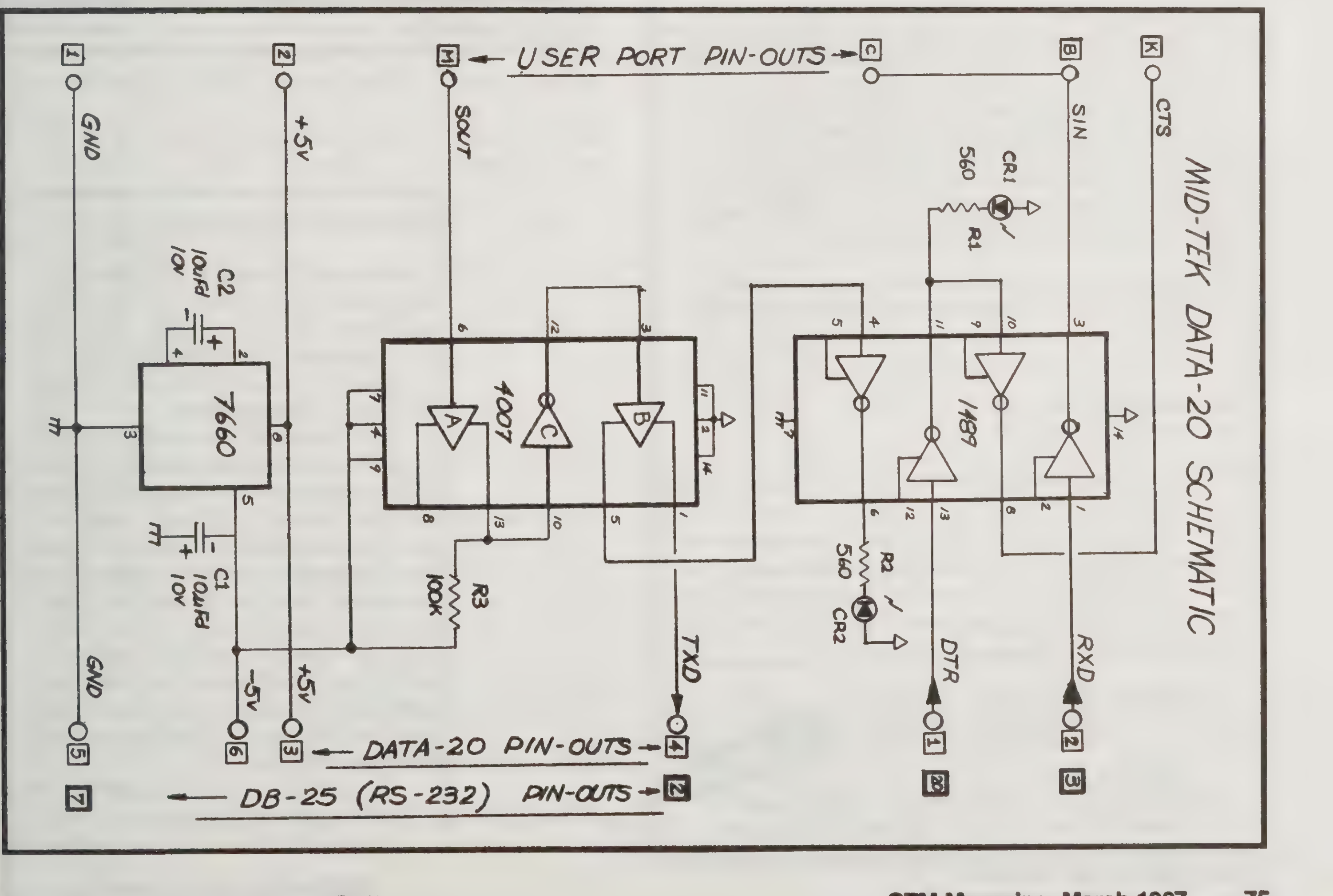
The Mid-Tek **DATA-20** cost $15.00, is well built, and readily available (Mid-Tek, POB 489, Harlan, Indiana 46743, tel (219) 657-5680). Mid-Tek accepts either money or plastic and has a reputation from prompt service.

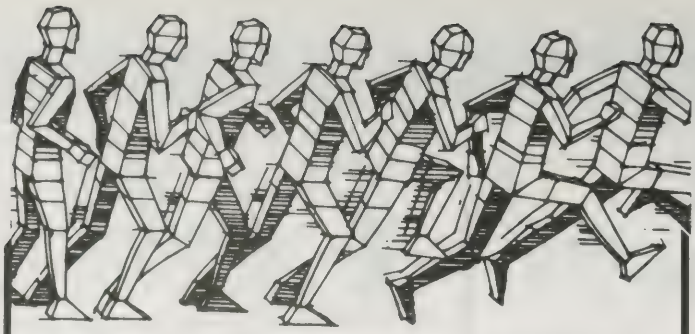
Connecting the DATA-20

The Mid-Tek **DATA-20** is admittedly a minimum device, lacking the features of more expensive adaptors. Figure 3 shows the connections for a basic 3-wire hookup, Data In, Data Out, and a common ground. The 3-wire arrangement will work perfectly well for a majority of users; those of you using hardware flow-control will have to strap a couple of additional control lines. When

Continued next page







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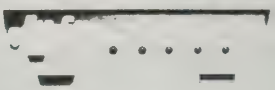

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Both digipeaters use a Z-80 processor which has up to 32k bytes of EPROM and two JEDEC sockets for 2, 8, 16, 32k bytes of battery backed RAM. A Z80 CTC is provided in the DR 200 for dual port scheduling interrupts. Packet HDLC operations are handled in hardware by a Zilog 8530 SCC. Both use the AMD 7910 LSI modem chip. Each modem channel has a standard disconnect header and time out timer. The CPU itself has a hardware watchdog timer and external hard reset line. The circuit board is RFI shielded by our extruded aluminum case. All connections are soldered to feedthroughs.

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Continued from previous pg.

you receive your **DATA-20** you'll also receive a pictorial showing the pin-outs of the psuedo RS-232 lines, the rest will be up to you.

Conclusion

The techies tend to run screaming when they see something as simple as the **DATA-20.** Here is an uncomplicated device that doesn't pretend to be all things to all people, it's just a basic tool that works extremely well. After buying the **DATA-20** and wiring a cable, you're all done; no fuss and no frills. Some people find this hard to take but I find it absolutely delightful! Try it.

Robert S. Hoover, KA6HZF
1875 Monte Vista Drive
Vista, California 92084 CTM

By J. C. Smith Jr.

Apple Core

The Apple-IBM Connection. Let talk to each other...

Several weeks ago I received a product called **"Apple-IBM Connection"** and I decided to do a review on it this month.

This communication program allows information to be transferred between an Apple II computer and an IBM PC. You can also use it to transfer information between two (2) Apples or two (2) IBM PCs.

The package consists of two (2) diskettes, one for the Apple, one for the IBM PC, a very comprehensive user's manual, and a cassette containing verbal instructions. The Apple disk is self-booting and copyable; the IBM disk does not have DOS on it. Instructions are supplied for preparing the disk for self-loading.

The documentation explains how to hook up the two computers, either remotely or locally. The diagrams and explanations are quite clear.

Explained in great detail is the actual process of transferring files.

There are four (4) possible transfer processes:

1. Apple to Apple
2. IBM to IBM
3. Apple to IBM
4. IBM to Apple

Basically all you do is stipulate which computer is the sender, which is the receiver, the type of error checking desired, and the names of the files being sent and created. The program does the rest.

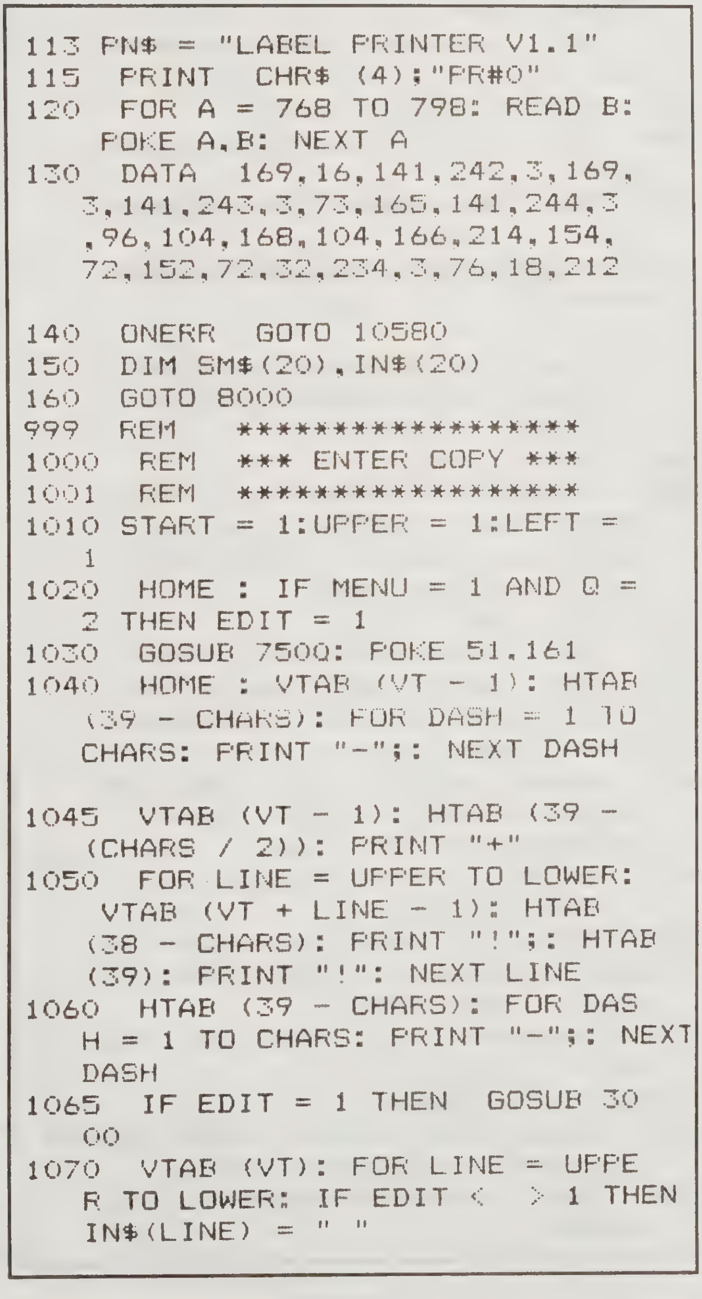
The user's manual also included instructions for creating an electronic mail network, a glossary of terms related to computer communications, and descriptions of several utilities which are included as part of the package.

The cost of this package is $195.

I really did enjoy this product. For additional information please contact: Alpha Software, Corp., 30 "B" Street., Burlington, MA 01803

Now for this months program which is called **"Label Priner V1.1.**

Type it in and follow the prompts. I think you'll enjoy using it.



```
113 PN$ = "LABEL PRINTER V1.1"
115  PRINT  CHR$ (4);"PR#0"
120  FOR A = 768 TO 798: READ B:
   POKE A,B: NEXT A
130  DATA  169,16,141,242,3,169,
   3,141,243,3,73,165,141,244,3
   ,96,104,168,104,166,214,154,
   72,152,72,32,234,3,76,18,212

140  ONERR  GOTO 10580
150  DIM SM$(20),IN$(20)
160  GOTO 8000
999  REM   ******************
1000  REM  *** ENTER COPY ***
1001  REM  ******************
1010 START = 1:UPPER = 1:LEFT =
   1
1020  HOME : IF MENU = 1 AND Q =
   2 THEN EDIT = 1
1030  GOSUB 7500: POKE 51,161
1040  HOME : VTAB (VT - 1): HTAB
   (39 - CHARS): FOR DASH = 1 TO
   CHARS: PRINT "-";: NEXT DASH

1045  VTAB (VT - 1): HTAB (39 -
   (CHARS / 2)): PRINT "+"
1050  FOR LINE = UPPER TO LOWER:
    VTAB (VT + LINE - 1): HTAB
   (38 - CHARS): PRINT "!";: HTAB
   (39): PRINT "!": NEXT LINE
1060  HTAB (39 - CHARS): FOR DAS
   H = 1 TO CHARS: PRINT "-";: NEXT
   DASH
1065  IF EDIT = 1 THEN  GOSUB 30
   00
1070  VTAB (VT): FOR LINE = UPPE
   R TO LOWER: IF EDIT <  > 1 THEN
   IN$(LINE) = " "
```

```
1080  HTAB (39): PRINT "!";: HTAB
   (38 - CHARS)
1090 IN$ = "": CALL  - 662
1100  FOR I = 512 TO 767
1110 X =  PEEK (I) - 128
1120  IF X = 13 THEN 1150
1130 IN$ = IN$ +  CHR$ (X)
1140 IN$(LINE) = IN$: NEXT I
1150  VTAB (VT + LINE - 1): HTAB
   (39 - CHARS): PRINT IN$(LINE
   );: HTAB (39): PRINT "'": NEXT
   LINE
1160 RT = 21: GOSUB 6200:EDIT =
   0: GOTO 8000
1999  REM  **********************
   ***
2000  REM  *** PRINT TEST LABEL
   ***
2001  REM  **********************
   ***
2010 TEST = 1: GOTO 4000
2999  REM  **********************
   ****
3000  REM  *** EDIT COPY ROUTINE
    ***
3001  REM  **********************
   ****
3010  VTAB (VT)
3020  FOR LINE = UPPER TO LOWER
3030  HTAB (39 - CHARS): PRINT I
   N$(LINE)
3040  NEXT LINE
3050  VTAB (21): HTAB (11): PRINT
   "ENTER NEW LINE OR": PRINT :
    HTAB (6): PRINT "PRESS <RET
   URN> FOR NEXT LINE"
3060  RETURN
3999  REM  *********************
4000  REM  *** PRINT LABELS ***
4001  REM  *********************
4010 Y = CHARS + 3
4020  HOME : VTAB (10): INPUT "H
   OW MANY LABELS ACROSS PAGE?
   ";A$:ROWS =  VAL (A$)
4030  IF TEST = 1 THEN FINISH =
   1: GOTO 4060
4040  PRINT : INPUT "HOW MANY LA
   BELS WOULD YOU LIKE? ";A$:FI
   NISH =  VAL (A$)
4050 FINISH =  INT ((FINISH / RO
   WS) + .5)
4060 RIGHT = ROWS
4070  GOSUB 6000: GOSUB 7000: GOSUB
   6100:TEST = 0: GOTO 8000
4999  REM  **********************
   ******
```

```
5000  REM  *** ENDING ROUTINE ME
   NU ***
5001  REM  **********************
   ******
5005  ONERR  GOTO 10580
5010 SM = 3
5020 SM$(1) = "RESTART PROGRAM"
5030 SM$(2) = "BOOT ANOTHER DISK
   "
5040 SM$(3) = "QUIT"
5050 MN$ = " END OF PROGRAM ":X$
    = "X": GOSUB 10500
5060  ON Q GOTO 8000,9000,30000
5999  REM  **********************
   *****
6000  REM  *** INITIALIZE PRINTE
   R ***
6001  REM  **********************
   *****
6010  IF IDS = 1 THEN 6040
6020  HOME : VTAB (10): INPUT "W
   HICH SLOT IS PRINTER CARD IN
   ? ";A$:SLOT =  VAL (A$)
6025  IF SLOT < 1 OR SLOT > 7 THEN
    PRINT  CHR$ (7): GOTO 6020
6030  PRINT : HTAB (8): PRINT "A
   LIGN PAPER FOR PRINTOUT":IDS
    = 1
6040 RT = 17: GOSUB 6200
6050  PRINT  CHR$ (4);"PR#";SL
6060  RETURN
6099  REM  **********************
   ***
6100  REM  *** TURN PRINTER OFF
   ***
6101  REM  **********************
   ***
6110  PRINT  CHR$ (4);"PR#0"
6120  RETURN
6199  REM  **********************
   *******
6200  REM  *** PRESS RETURN ROUT
   INE ***
6201  REM  **********************
   *******
6210  POKE  - 16368,0: VTAB (RT)
   : CALL  - 958: HTAB (8): PRINT
   "PRESS ";: INVERSE : PRINT "
   <RETURN>";: NORMAL : PRINT "
    TO CONTINUE"
6220  IF  PEEK ( - 16384) <  > 1
   41 THEN 6220
6230  POKE  - 16368,0: RETURN
6999  REM : *********************

7000  REM : *** PRINT LABELS ***
```

```
7001  REM : ********************

7010  FOR LABEL = START TO FINIS
   H
7020  FOR LINE = UPPER TO LOWER
7030  FOR COLUMN = LEFT TO RIGHT

7040  PRINT IN$(LINE); SPC( Y -
    LEN (IN$(LINE)))
7050  NEXT COLUMN: PRINT
7060  NEXT LINE: PRINT
7065  IF (FINISH - LABEL) < ROWS
    THEN RIGHT = RIGHT - 1
7070  NEXT LABEL: RETURN
7499  REM  *****************
7500  REM  *** LABEL SIZE ***
7501  REM  *****************
7505  IF EDIT = 1 THEN  RETURN
7510 MN$ = "LABEL SIZE"
7520 SM = 3
7530 SM$(1) = "15/16 X 3-1/2"
7540 SM$(2) = "1-7/16 X 4"
7550 SM$(3) = "2-7/8 X 3-7/8"
7560 SEL$ = "WHAT SIZE ARE YOUR
   LABELS?"
7570 MENU = 2: GOSUB 10500
7580 SIZE = Q
7590  IF SIZE = 1 THEN LOWER = 5
   :CHARS = 34:VT = 9: RETURN
7600  IF SIZE = 2 THEN LOWER = 8
   :CHARS = 37:VT = 7: RETURN
7610  IF SIZE = 3 THEN LOWER = 1
   7:CHARS = 36:VT = 2: RETURN

7999  REM  *********************
   *******
8000  REM  *** INITIALIZE MAIN M
   ENU ***
8001  REM  *********************
   *******
8010 SM = 5
8020 MN$ = "LABEL PRINTER"
8030 SM$(1) = "ENTER COPY"
8040 SM$(2) = "EDIT COPY"
8050 SM$(3) = "PRINT TEST LABEL"

8060 SM$(4) = "PRINT LABELS"
8070 SM$(5) = "QUIT"
8080 X$ = "X"
8090 SEL$ = "< ENTER YOUR SELECT
   ION >"
8100 MENU = 1
8110  GOSUB 10500
8120  ON Q GOTO 1000,1000,2000,4
   000,5000
8999  REM  *************
9000  REM  *** REBOOT ***
```

```
9001  REM  *************
9010 D$ =  CHR$ (13) +  CHR$ (4)
   :ERR =  PEEK (222)
9020  ONERR  GOTO 9070
9030  HOME : VTAB (8): HTAB (11)
   : PRINT "INSERT ANOTHER DISK
   ": PRINT : HTAB (19): PRINT
   "THEN"
9040 RT = 12: GOSUB 6200
9050  PRINT D$;"VERIFY ";PN$
9060  HOME : VTAB (10): HTAB (9)
   : PRINT "THIS IS THE SAME DI
   SK!!":RT = 12: GOSUB 6200: POKE
   216,0: GOTO 5000
9070  PRINT D$;"PR#6"
10499  REM  ********************
10500  REM  *** MENU ROUTINE ***

10501  REM  ********************

10502  IF MENU <  > 1 GOTO 10515

10503  GOTO 10506
10504  FOR X = 1 TO 40: PRINT X$
   ;: NEXT X: RETURN
10506  HOME : GOSUB 10504
10508  FOR X = 2 TO 21: VTAB (X)
   : PRINT X$;: HTAB (40): PRINT
   X$: NEXT X
10510  VTAB (22): GOSUB 10504
10515  VTAB (3): HTAB (20 -  LEN
   (MN$) / 2): PRINT MN$
10518  IF MENU <  > 1 GOTO 10525

10520  PRINT : GOSUB 10504
10525  VTAB (7): HTAB (4): PRINT
   "YOUR SELECTIONS ARE:"
10530 V = 9:HH = 11:HT = 14: FOR
   I = 1 TO SM
10535  VTAB (V + I): HTAB (HH): PRINT
   I;". ";SM$(I): NEXT I
10537  PRINT : PRINT : HTAB (20 -
    LEN (SEL$) / 2): PRINT SEL$

10540 Q =  PEEK ( - 16384): IF Q
   < 127 THEN 10540
10545  POKE  - 16368,0:Q = Q - 1
   76: IF Q < 1 OR Q > SM THEN
    PRINT  CHR$ (7);: GOTO 1054
   0
10550  VTAB (V + Q): HTAB (HT):
   INVERSE : PRINT SM$(Q)
10555  NORMAL :QQ =  PEEK ( - 16
   384): IF QQ < 127 THEN 10555
10560  POKE  - 16368,0: IF QQ =
   141 THEN 10575
```

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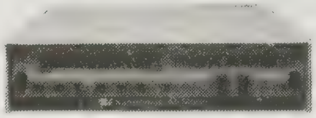

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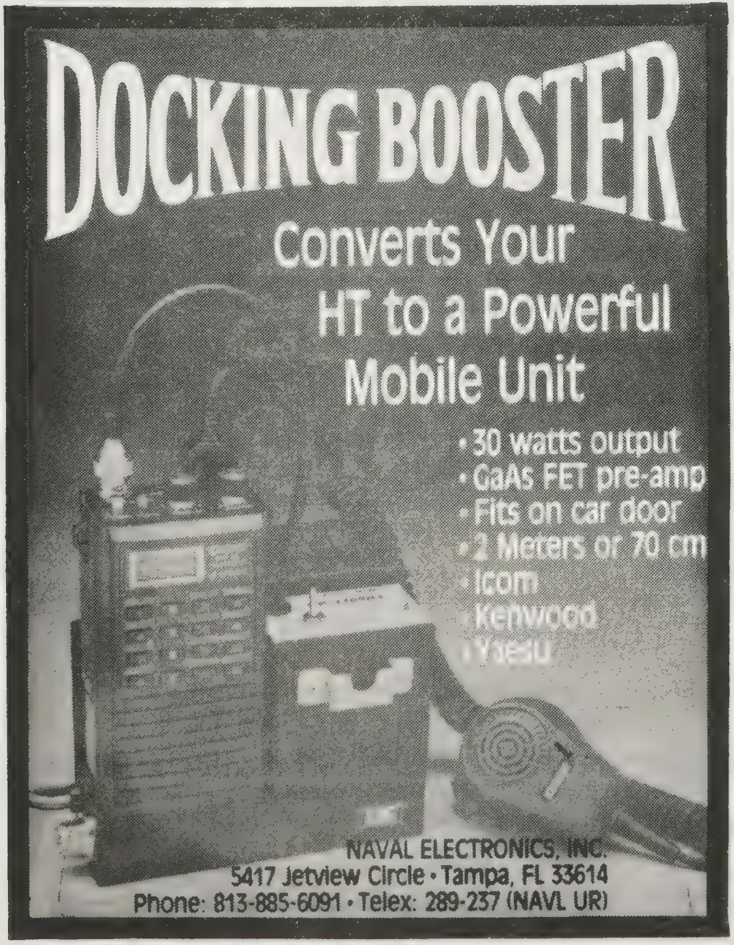

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```
10565 QQ = QQ - 176: IF QQ < 1 OR
   QQ > SM THEN  PRINT  CHR$ (7
   ): GOTO 10550
10570  VTAB (V + Q): HTAB (HT):PRINT
   SM$(Q):Q = QQ: GOTO 10550
10575  RETURN
10580  GOSUB 6100
10584 EN =  PEEK (222):LN =  PEEK
   (218) +  PEEK (219) * 256
10585  IF EN = 255 THEN  PRINT  CHR$
   (7);: POKE  - 16368,0
10590  IF LN = 10540 THEN  GOTO
   10540
10595  IF LN = 10555 THEN  GOTO
   10555
20000  HOME : VTAB (10): PRINT "
   ERROR NO. "EN: PRINT "IN LIN
   E NO. "LN: END
29999  REM  ***********
30000  REM  *** END ***
30001  REM  ***********
30010  HOME : VTAB (10): HTAB (1
   5): PRINT "NORMAL EOJ": VTAB
   (23): END
```

The above program was submitted by Pandora Software. They have a catalog of over 4000 Public Domain programs available between $.15 to $.25 per program. All programs run on the Apple II computer. All programs are copyable and listable. There are 54 catagories to choose from. They will be happy to send you a free catalog upon request. They will send you a copy of a volume that contains a listed program for only $5.00.

Write them at: Pandora Software., P.O. Box 590., Clearfield, UT 84015 and don't forget to mention this column and **CTM.**

That's it for this month. Please send any comments and or questions to me at:

Joe C. Smith Jr.
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By Alan Smith, W8CHK

Daddy Does Dayton

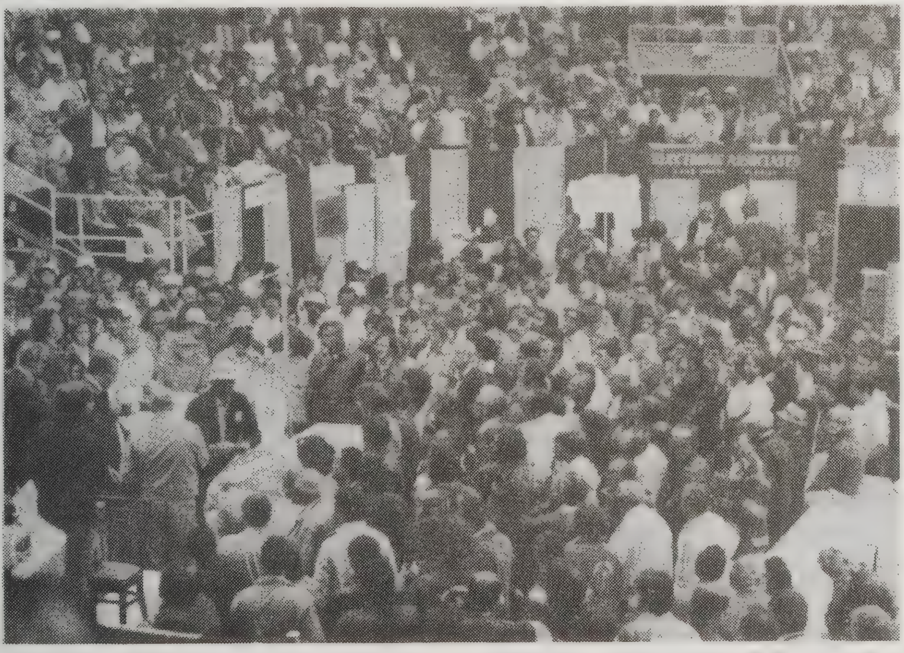
The Dream of most HAMs is to go to The HamVention® at least once. This short article will tickle your imagination and get your juices flowing

If the family picnic is indeed on the wane, it's essence lives on in the expanding numbers of ham radio's regional gatherings whimsically known as Hamfests and Fleamarkets.

The clear winner in this category-from any viewpoint-is known to the world as the Dayton HamVention®. Boldly once each year, the marquee of the city of Dayton's Hara Arena declares its immutable 3 day purpose.

Credit for this event and the fact that each succeeding year becomes an even greater success than the one previous, must go to the remarkable talents of DARA members, but it must also be said that the association is making the most of what is a world class opportunity for repeated mass response to the persuavsive lure of shared understanding. Common ground.

The raw vitality of this gathering, like nothing else, resembles a gigantic family picnic and reunion with traps set in every direction to snare new family members. Like butterflies fluttering south with the sun, lemmings to the sea and locusts to wheat fields, the opportunity to polish the arcane and never finished crafting of the Ham calls without cease to the faithful all through the long months between gatherings. The routes of access to this annual swarming ritual by air or by road, often well committed to memory, are well known and uncomplicated. The main route is well traveled.



Getting set to begin the main prize drawing event. The balcony is filling rapidly and the crowd around the prize display area will soon be requested to clear the floor.

From its northernmost reach at the neck of Lake Superior (one foot in the water-so to speak) Interstate 75 is a 2,000 mile stained silver ribbon which runs like a homesick angel for a lick of salt (other foot in the water) at the lush Florida city of Fort Meyers.

Sixty miles north of the I-75's leap across the Ohio river, this restless north-south roadway slips gracefully through the city of commerce called Dayton. All travelers on the road, with this city in view as a destination for a visit or a break--there is a plenty of exists--should be made aware of the lure of this place.

It is the lot of visitors who enter Dayton, on purpose or under impulse, to either stay longer than planned or return sooner than expected. And this tendency is apparently due in part to a curious blending of advantages resident in this locality--a sort of symbiosis--that a native Daytonian takes for granted and a newcomer learns to wonder about.

The State of Ohio itself is full of wonders. One could almost believe that the whole Dayton area is the center of some sort of cosmic eddy that inspires creativity and innovation. Such talent appears to have flourished here for at least 10,000 years (which is not to say

WB8KKZ "Mark" Checks out a rugged looking monitor before making an"offer" as the sign sugests.

that anyone associated with the HamVention is that old). And with the benefit of well recorded more recent history, we can see the result of this influence quite clearly in our own time.

Creative talent has been in obvious residence here from the late 1700's to the present. Names like Harriet Beecher Stowe, Boss Kettering and brothers Wright have national recognition, but afford only a glimpse of the full roster.

The prehistory occupants of this magic land have long ago vanished. But while their art and craft lingers on as though to testify to their own wonder, the present day articifers are alive and well and can regularly be seen at the HamVention.

Although the term "Hamfest" is the tag often given to the hundreds of one day affairs that spring up over the North American continent at all times and in all seasons, the Dayton HamVention is rightly named. It is more than a festive occasion and it is more than a convention. It would be difficult to find a more diversely oriented yet single minded assembly of people anywhere. This bursting at the seams gathering of "Hams" can hardly escape the name it has been given.

That this group is representative of a non-professional activity is spelled out in the official sanction of Amateur Radio. While the term Amateur Radio puts a name on the lawful on-the-air-activity allowed under the terms of federal license, the benefits to society which result from technical development and emergency communication within the amateur radio service are professionally derived by any measure.

The fundamental responsibility of the amateur radio service is undeniably emergency communication; always ready. The testing and fulfillment of this responsibility is another story altogether, but should be kept in view as being a part of the motivation which must surely fuel the Dayton HamVention itself.

But for whatever reasons exist with the power to draw multiple thousands of Hams to Dayton (at times with nothing heavier than a desire to mingle and look at the wonderful toys), year after year, it is a draw that knows no certain boundries. Name an occupation. Any occupation. Somewhere, someplace, there is a ham in that business, profession or trade with plans to make his or her way to the HamVention; if not this year, then next.

Come springtime, the rite of Dayton, like all spring rites, not only brings back the regulars, but also attracts new crops of hot eyed first timers, eager for initiation.

Plainly speaking, these latter should be carefully advised that there will be scant chance of turning back from the world they are about to enter. They should foreknow that all greenhorns who enter the Hara arena during the last week-end of April any year, and being in an innocent state of mind, run the risk of quick seduction by the HamVentions siren song. And that once captured, there is little hope of escape.

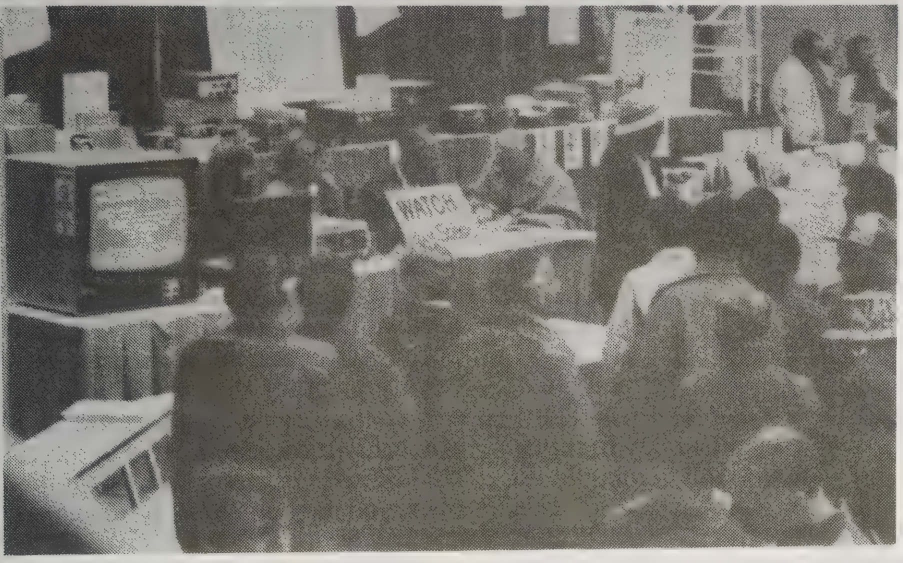
Some of the common influences which sway people one way or another can be pretty much discounted. Age, for one, appears to be of little importance. The very young and octogenarians are equally visible here. The bewitchment of the HamVention is ageless and age itself is only numbers in this game. It seems to be true of some HamVention addicts, that life itself must end before a Dayton pilgrimage loses meaning.

Oh sure, there is always the imagined lure of opportunity to revel in the exclusive company of a male peer group. But such exclusiveness is a fading hope at Dayton and can no longer be considered a major inducement.

How sweet it is. The presence of the ladies is unmistakable. Their intelligence and enthusiasm speaks clearly of the great body (no pun intended) of talent just waiting to be fully awakened to the tender mercies of this genderless lover, amateur radio.

Now, it is well known in the real world, that voluntarily or involuntarily, just about everybody joins something. This clumping up activity is commonplace wherever people gather to work or play. The unique factor in the spring rite of Dayton is that the gathering is remarkably self-energizing. If the communication modes were not such common knowledge, this curious linking would appear to be paranormal... One factor must be the lack of so called "socail" boundries to limit access to Dayton HamVention. This event is truly

You name it we've got it! Bargain hunters, some heavy on patience and light \on money and others searching for rare or obsolete replacement parts often find just what they are loking for in the Ham Vention fleamarket.



Elevated tables and racks show off the great variety of door prizes donated by manufacturers and dealers represented at the HamVention.

cosmopolitan, complete with its own stereotypes.

Cliche personality statements reflect flourishing subcultures,both relevant and irreverant.... Caps and tee shirts, jackets and badges tell some of the story. For all who enjoy observing the passing parade, the show is rivetting.

In recent years, the number of YL's and XYL's attending the HamVention has shown a steady increase. It goes without saying, that any communal assembly of human spirits is made larger, classier and yes, -- more civilized when the female of the species is present. The spring rite of Dayton is no exception. The growing presence of the ladies is an indicator of greater dimension than numbers would suggest.

There are, for instance, the soon-to-be and already-there lady hams. These girls tend to "dress" for the occasion, a la field day practicallity. If you happen to pick-up on a conversation coming out of this group, don't be surprised if you hear the familiar exchange of ham jargon. No half measures in the ladies camp. Another plus for the HamVention is that more and more non-ham spouses (XYL's) and non-ham lady friends (YL's) are learning that this event is more than it seems. Word has spread that the DARA operating committee, in its manifold wisdom and foresight has responded agressively in providing for the entertainment of non-ham visitors to the HamVention. As a result, a support group of DARA women are on hand to offer varied and interesting alternate program arrangements for all visitors who want to get away from the technical aspects of the show.

A carefully structured program of lunches, craft demos and sightseeing is focused on non-ham people who like traveling to the HamVention with their playmates, but are not personally involved with the primary purposes of the HamVention.

Clearly, the aim of this special outreach is to the non-ham spouse. It should not come as a surprise that these gals arrive ready for a trip on the town. It is a great opportunity (now that the secret is out) that more of Hamdom's "grass widows" should sample.

Here is a chance girls, to get some leverage from the OM's obsession.

This guy is likely to be continually on the prowl for information. From day one to the last dwindling hour, he will be looking for parts, equipment and those inevitable eyeball-contacts. At the end she is quite ready to get on home and he is in the depths of a blue funk because it is all over.

The HamVention's life blood, however, is pumped through the arena's halls and rooms and outside acres by the legs and wheelchairs of thousands of federally franchised prodigiosities. Hams.

Hams and "Ham types" fuel this remarkable machine.

Male and female, as diverse a people as those anywhere. But there is little doubt, that for sheer intellect, this group will outpoint any similiar sized group which is drawn from general population of the world at large. Clues abound, but there is one that says a lot. Crowd behavior.

HamVentioners are, on the whole, remarkably civilized. This shows up very plainly on those few unhappy days when the weather turns dreadful. Few, if any will give up and leave because of the weather. After all--the arena itself can support 2 or 3 days of shopping, so the attitude is to, "have at it."

The kindest thing to say about a move inside to avoid being rained is that the whole place becomes crowded. It is only the overall restraint of the crowd itself that provides control. On these occasions, nothing can be done except to hoot on the local weather person.

Fortunately, the DARA crew seem to be well regarded by the

WB8YOB and WB8KKZ grab a chanc for a cup of coffee during asudden rain shower local meterological folk and prolonged wet weather on this weekend is quite rare. But when it can happen and happy is he or she that has an umbrella handy.

The sense of community to be found at the HamVention tends to be duplicated in some measure at all the lesser swap'n shop events which are regular events all across the United States and Canada.

Considering the great variety backgrounds represented at the HamVention, the sense of community is remarkable. Amateur radio is a true rainbow mix. The opportunity to work and advance, pretty much without limit, is this demanding activity is undoutably a big draw. The desire to advance ones skills and expand the station are pressures everyone feels. Unhappily, the means to do these things is not always within reach. One thing leads to another and at Dayton, this need has boosted the concept of the "flea market" to astronomical proportions.

There will always be a need for "good" used gear as well as salvage stuff, and free lance give and take flea market merchandising represents a sizable part of the attraction of all hamfests. The Dayton Hamfest fleamarket is without peer.

As in all walks of life, there are many who are not affected by a tight budget and at Dayton no stone goes unturned in making the way easy for the big ticket people to operate. The fixed costs of this event would be very daunting if it were not for the certain presence of customers to attract and patronize commercial exhibitors.

Rarely do industrialists and business people get an opportunity to make immediate direct sales and influence future sales as is possible at the HamVention. The show is heavily attended by retail level buyers and that is what everybody goes to Dayton for, to buy, trade and sell.

The result is that the merchandising potential, short and long term, of the HamVention is not lost on communications appliance and hardware manufacturers. The opportunity to be seen by as many as twenty to thirty thousand potential customers during a 3 day run is a powerful inducement to be there. And there they are. Happily for the overhead conscious DARA finance committee.

SO--go as a buyer. Go as a seller, or just for the fun of it. Please your life partner, and GO !

Alan Smith, W8CHK
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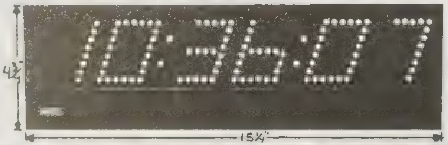

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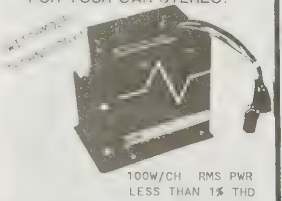

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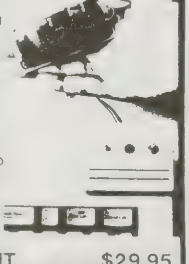

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W8ZXH

By Ed Shaughnessy

Machine Language

By using machine language to call the scroll and the clear screen routines in ROM, you can achieve results that you normally never see. These routines have a flexibility that you can't take advantage of from Basic. They allow you to specify the exact number of lines you wish to scroll or clear by loading the desired number into register B before calling the routine.

I promised you last time that I'd use the CALLER subroutine to demonstrate these two ROM routines. The CALLER subroutine allow you, in Basic, to set the value of certain registers before you call a machine language routine with the USR command. We'll use it here to set the value of the B register before calling the clear and the scroll routines.

The program in Listing 1 contains the CALLER subroutine and the additional lines added to it to demonstrate the two ROM routines. Key in the program. If you already keyed in the CALLER program last month, you can save some time. Load the original CALLER program, and key in just the odd numbered statements in Listing 1.

Look carefully at statements 75 and 155. These are the statements that call the ROM routines. If you understand what these statements do in Basic, you should be able to call these two ROM routines from your own ML routines.

Line 75 executes the clear routine. First it sets the variable ADDRESS to 2431, the decimal address of the CL-LINE routine. Then it calls the subroutine at 9000, which will in turn call the machine language code at the address that was specified. Since line 75 is in a loop, it executes 8 times. The value of the variable B, which represents register B, is different each time the routine executes. The first time B equals 5, the next time 6, and so on. This means the first time 5 lines will be cleared, the second time 6 lines, and so on.

Lines 155 executes the scroll routine. It sets ADDRESS to 2363, the location in ROM of the CL-SCROLL routine. It sets B equal to 10. Then it calls the subroutine at 9000. Since line 155 is also in a loop, is executed 8 times. In this case, however, the value of B stays the same for each execution. Each time the routine is executed, the bottom 10 lines of the screen will scroll.

Let's watch the screen when these ROM routines execute. Run the program. It begins by writing test lines on the bottom half of the screen. The first time through, the speed of the program is under your control. It will execute the ROM routine only when you press ENTER. This allows you to step through at your own pace, as you watch the effect on the screen. The clear-screen routine is demonstrated first. The first eight times you press ENTER, you will see lines at the bottom of the screen being cleared. First 5 lines will be cleared, then six, and so on. Then the test lines are written back onto the bottom of the screen so that the scroll routine can be demonstrated. The next eight times you press ENTER, you will see the bottom ten lines of the screen scroll. Watch closely. Each time you press ENTER, some lines will disappear as they are scrolled out of the bottom 10 lines of the screen. The lines above them, lines 10 through 12, remain unchanged.

The second time through, the program is still under your control. Press ENTER each time you want to execute the routine. Additional information now appears. The program displays the value of the top item of the stack at the time of the return from the routine. Why do we want to know this information? It's unrelated to this program, but we'll use it in the future.

After the second time through, the program will no longer wait for you to press ENTER. It will repeat endlessly, creating an accordian effect on the screen. To stop it, press BREAK.

NOW TRY IT WITH HOTZ

You would normally call these routines from a machine language program. Let's do that. Make a short assembler routine to do the same as line 155. First, load HOTZ. You want to call the scroll routine that is at decimal address 2363 in ROM. You'll have to convert this number to its hexadecimal equivalent. Let HOTZ do the work. Put HOTZ into data display mode by pressing Symbol-Shift/THEN. Hex numbers will appear on the left column and their decimal equivalents appear in the middle. You can use the data display screen of HOTZ whenever you need to change numbers from decimal to hex or from hex to decimal. In this case, you are going from decimal to hex, so tell HOTZ that you are about to key a decimal value by pressing Symbol-Shift/OR. Then key in 2363 and press ENTER. The 2363 will appear in the middle of the screen and the hex equivalent will appear on the left. Write down the hex value for later. Then press Symbol-Shift/THEN to return HOTZ to disassembly display.

You can now enter the assembler code. Let's put the code at decimal 45000. Don't worry about what the hex equivalent of 45,000 is. Just press Symbol Shift/OR - to tell HOTZ another decimal number is coming - and key in 45000. This puts you at 45,000. (If you don't believe it, temporarily go into data display mode and look at the middle column showing the addresses in decimal.) To get HOTZ into assembler mode, press Symbol-Shift/Stop. The cursor will jump to the middle of the screen and HOTZ will wait for you to key in the assembler statements. Your program will consist of three statements. First, you must load register B with 10. Remember to use the hexadecimal equivalent of 10. Second, you must CALL the routine at 2363. Use the hex equivalent of 2363 that you wrote down earlier. Finally, you must have a RET statement. When you have keyed in these three lines, return to Basic from HOTZ. Before calling your scroll program, create some lines at the bottom part of the screen so there'll be something to scroll. If you still have the Basic program from Listing 1 in your computer, you can do this using the subroutine at 8000. Key in the following.

```
GOSUB 8000                (ENTER)
RANDOMIZE USR 45000   (ENTER)
```

Repeat the RANDOMIZE command several times as you watch the screen.

HOTZ can do a lot. In fact, it does so many things that the manual can seem overwhelming at times. Don't try to learn HOTZ. Try to use it. Don't worry about the parts of HOTZ that you don't understand. You probably don't need them. Yet. Look at HOTZ as a toolbox. Use the tools you need. Occasionally take a new tool out of the box and play around with it. Whenever you use a function in HOTZ that is new to you, underline that part of the manual so it will be easier to use in the future. If some day you have one third of the manual marked up, you will have gotten your money's worth several times over. And eventually you'll find you're using HOTZ more and more without referring to the manual.

LISTING 1

```
   1 REM Use CALLER subroutine to demonstrate CLS-B and CL-SCROLL ROM routines.
   2 GO SUB 9050: REM Initialization
   5 LET SW2=0: LET SW3=0
  15 IF SW3=0 THEN  PRINT  AT 0,0;"Keep pressing ENTER to continue."
  25 IF SW3=0 AND SW2=1 THEN  PRINT "Top stack item at time of RET:"
  35 GO SUB 8005: PRINT  AT 2,0;: IF SW2=1 THEN  GO TO 65
  45 REM *********** Call the Clear routine in ROM 8 times ***********
  55 PRINT "CLS-B will execute 8 times. Register B varies from 5 to 12."
  65 FOR B=5 TO 12
  75 LET ADDRESS=2431: GO SUB 9000
  85 REM
  95 NEXT B
 105 GO SUB 8005: PRINT  AT 6,0;: IF SW2=1 THEN  GO TO 145
 115 REM ********** Call the Scroll routine in ROM 8 times ***********
 125 PRINT  AT 2,0;"CL-SCROLL will execute 8 times. Register B always equals 10"
 135 PRINT "      Notice lines 10 through 12 stay the same."
 145 FOR R=1 TO 8
 155 LET ADDRESS=2363: LET B=10: GO SUB 9000
 165 NEXT R
 175 REM **********
 185 IF SW2=0 THEN  LET SW2=1: CLS : GO TO 15
 195 IF SW3=0 THEN  LET SW3=1
 205 CLS : GO TO 15
8005 REM #################### Display test lines ######################
8015 REM Print the test lines that will be cleared or scrolled.
8025 PRINT  AT 10,0;
8035 FOR L=10 TO 21: FOR C=1 TO 4
8045 PRINT "LINE ";L;" ";
8055 NEXT C: NEXT L: RETURN
9000 REM ########## CALLER subroutine ##################################
```

By George E. Taylor, WA4GUW

Commodore 64

User Port Interface

Have you wanted to use your C-64 to control external circuits? If so, read on. The computer can control, by simple commands, the user port.

Breadboard the circuit as shown and control a light, motor, etc. with your computer. The simple circuit shown may not do all you want to do but it is a good demonstration of the computer's capability. For example, connect the solid state relay as a load for the transistor then series the SSR contact with a light bulb and a 120 Volt AC supply. The lamp can be turned on/off using commands to the computer. Commands can be typed in directly (without line numbers) or type in and use the short program shown here.

Identical circuits can be built for each of the eight bits (0-7) with seperate control for each one. The commands are the same except change the "0" in the command to the bit number you wish to control. The user port and joystick ports can also be used as inputs to the computer thereby enabling the computer, with the approprite program, to become a burgler alarm, machine controller, etc.

BE SAFE, have fun. . .

George Taylor, WA4GUW
209 Lakeshore Drive
Muscle Shoals, Alabama
35661 **CTM**

```
5 REM USER PORT CONTROL PROGRAM FOR BIT "0"
10 POKE 56579,PEEK(56579)OR(2^0):REM SETS BIT "0" AS AN  OUTPUT
20 PRINT"{SC}":PRINT:PRINT:PRINT,"      MENU":PRINT:PRINT
25 PRINT"       (BIT 0 IS AN OUTPUT) ":PRINT:PRINT
30 PRINT,"0  TURN OFF":PRINT
40 PRINT,"1  TURN ON":PRINT:PRINT
50 PRINT:PRINT SPC(8)A$:PRINT:PRINT:PRINT:PRINT
60 INPUT"      SELECT 0 OR 1";A
70 IF A=0 THEN POKE 56577,PEEK(56577)AND(255-2^0)
80 IF A=0  THEN A$="(BIT 0 IS OFF)"
90 IF A=1 THEN POKE 56577,PEEK(56577)OR    (2^0)
100 IF A=1  THEN A$="(BIT 0 IS ON)"
110 GOTO 20
120 REM  COMMANDS ARE THE SAME FOR ALL      BITS,CHANGE "0" TO DESIRED BIT.
130 REM BY   GEORGE TAYLOR  WA4GUW
140 END
    READY.
```

Continued from previous pg.

```
9020 LET BC=(256*B)+C: LET DE=(256*D)+E: LET HL=(256*H)+L
9025 IF SW3=0 THEN  PAUSE 0
9030 LET X=A+(BC+(DE+(HL+(ADDRESS+ USR 40000))))
9035 IF SW2=1 THEN  PRINT  PEEK 39998+256* PEEK 39999,
9040 RETURN
9050 REM ########## Create ML code used by CALLER subroutine ########
9060 LET CSUM=0
9070 FOR I=40000 TO 40041
9080 READ X: POKE I,X: LET CSUM=CSUM+X
9090 NEXT I
9100 DATA 42,101,92,229,33,96,156,229,205,96,49,197,205,96
9110 DATA 49,197,205,96,49,197,205,96,49,197,205,96,49,121
9120 DATA 193,209,225,201,225,34,101,92,225,229,34,62,156,201
9130 IF CSUM <> 5824 THEN  PRINT "Error in DATA statements": STOP
9140 LET A=0: LET B=0: LET C=0: LET D=0: LET E=0: LET H=0: LET L=0
9150 LET BC=0: LET DE=0: LET HL=0: RETURN
```

Ed Shaughnessy
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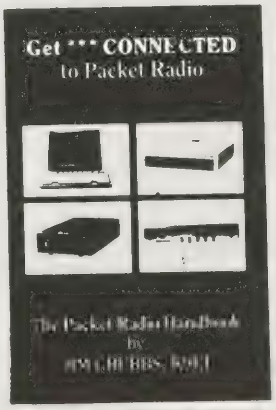

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Your Letters

Doesn't like CTM

1/26/87

Re the sample copy of **CTM** addressed as above:

I have never been exposed to a more illiterate magazine in my 40 years in publications. Furthermore, the magazine is rife with misspellings and typos, for which there is no excuse. Try a spelling checker on your MAC!

Blccch!
Robert Stein
Los Altos, CA

*Mr. Stein, from the tone of your note, there isn't any way I could explain to you why you find typos and misspellings in **CTM**. I am in hopes another one or two of my subscribers out your way will explain to you just what has happened over the past 5 plus years and how **CTM** is put together each month and the way it came about. I am very sorry and I too, wish I could do a better job but I can only use what I have and when I start making money, I can hire help and that will increase the quality of the product. I do agree with you but I am so glad I have a family of subscribers who are not quiet as tough as you and seem fairly pleased with what they get each month. In fact I bet I get just as many letters telling me I shouldn't have printed your letter but I have a responsibility to my **CTM Family**. Thanks for taking to time to write. Chet*

Likes CTM Looks

February 2, 87

Dear Chester:

The January issue of **CTM** looks and reads great! i really like the SSTV article. That is something I have tried a little with ancient equipment and found that I like it. I hope that you can continue to run more articles like this one.

Now for what I am writing about. Hamfest Chattanooga will again be the 4th weekend of **OCTOBER**, not July as you show in the Coming Events column.

I hope that your charming mother is well and happy, however, how anyone caoulbe be happy and have a sone like you is more than I can figure. Hi Hi. i hope that the magazine is starting to show a little profit. It sure is a lot easier to work your brains out if you are making a little money out of it.

Cha and i are about to start our mail-order battery business. As soon as we get going, we will talk to you about an ad. If everything falls into place, that should be by summer.

Very truly your,
Charles E. Curle, AD4F
Ooltewah, Tennessee

*Charlie thanks for writing and I am real pleased you like our **CTM**. Our writers sure work hard to bring you the best in ham and computer coverage. And, I think they are doing a bang-up job.*

Yes, I know I goofed. Rather my PageMaker software I use for publishing dropped a line from the coming event listings. I talked with Nita in Miami who told me about my mistake.

I hope you and Charlie Ann will do well with your battery operation and if I can help with the advertising, just let me know.

Take care my friend and will probably see you soon. Chet

Pleased with CTM

2-4-87

Chet:

All is forgiven. **CTM** arrived today and I was overwhelmed! By size etc. I should have listened to Ken Carpenter KC4UG (Vernon AL) when I bought the "VP" CWSS Pen for a SX81 and TS1000 both in Kentronic K.B. that was in '84.

So it is my loss up to now. Rick of T/S Horizons sent issue #21 and will keep on to #29. He and QZX are always way behind but my idea is to keep Sinclair/Timex viable. I felt with those two and Time Design with Sum were enough but of course Sum is now dead. To say the least you pleasantly surprised me plus some good advertisers

73
Al Francis W6OOA
Yucaipa, CA

Al, you are just one of thousands

who didn't know just how good **CTM** *is until you get a copy. I wish I knew more about making ads but I don't and I can't afford a professional ad maker. I will just have to limp along as I have been doing for the past 5 1/2 years. Sooner or later, people will find out about us and when enough of them do, then we will start to make a living out of this work.*

Yes, there won't be too many T/S magazines soon. As you Said SUM is gone and T/S Horizons going that will leave Time Design, QZX for we hams and **CTM** *for* ***everybody.***

I talked to Rick a couple of weeks ago and offered to help with taking over his subscription list and complete the subscription requirements for his subscribers. The nice thing about the offer is , since we cover more than just the T/S computers and so many people have more than just the T/S they would be getting a much better deal. Oh well, I don't think he will take me up on it but at least I tried.

I'm glad you like **CTM** *please tell your friends about us. Chet*

Needs an Apple II Drive

2-4-87

Chet:

Here is my check for my subscription. I thought because of missed issues it didn't end until March of 1987.

I have a little girl in my classroom who has Leukemia. I want to purchase a used Apple II Computer disk drive. I'd even take a clone if necessary. I'd like to put the Apple and disk drive in her home so that when she misses school because of hospital visits and illnesses I'd have disk prepared for her to use at home. I teach at the Leonhard School 20900 Independence Road, Southfield, MI 20900. I'd even take one that didn't work and then get it repaired.

Mel

Mel, I thought I had a used Apple II drive but I must have sold it. I couldn't find it. I bet one of our readers will send you one and you may even end up with more than you can use. If you don't get one within a month or so, I'll renew you subscription and you can use the $18. toward a drive. I am betting one or more of our readers will be sending you one or more.

Just let me know. Chet

Likes Bob Patterson's Articles on Astronomy

February 9, 1987

Dear Chet:

I received my February issue today. You are getting closer to mailing on time! My January issue was missing pages 61 through 68. Please send me a copy with these pages. If you can't send the complete magazine, send the article on radio astronomy by Bob Patterson. Bob is an old friend from Columbus, MS. I lost track of him after Vietnam where Bob was a helicopter pilot. I will get in touch with him on 75 meters.

You have some great new writers and I hope the readers will support them better than some of the past readers. I know that is why we lost some writers. I'm also pleased to see that they are covering a wide range of subjects.

One suggestion. Run personal classified ads only one month for "for sale" items. I called to inquire about a VIC 20 and was told the VIC was sold several months ago. Think about how many phone calls the poor guy received. This is one case where more is not better! I know you had good intentions but this MAY be the reason there is not more ads sent to **CTM.**

Chet, you have a great magazine packed with the things most hams want to see. I believe 1987 is the year you have to get the magazine out on time with less mistakes. Your old readers will hang in there with you but the new subscribers will expect more.

I can't remember if I ever sent you the two articles for the TS2068. One is a program that will send CW without an interface and the other is a code practice program. I may send something on working DX with low power. I have had lots of experience doing this and past 23 years. Just got my first amplifier and it sure is easier to work the pileups!

Best Regards,
Ken Carpenter, KC4UG
Vernon, Alabama

Ken it sure was good to hear from you. It would be better if you were still writing for us. We could use you.

I have an idea you are right about the classified ads. Starting with this issue, I will only run the free ads for ***one month.*** *That my be the reson we don't have more classifieds. I just can't hardly believe we don't have pages and pages of ads, especially when they are free to subscribers. It just doesn't make sense to me but maybe you got it right.*

I hope you are right about 1987, it sure could be a great year if we could start making money. It would make it so much better if I was making a living. I keep saying one of these days, maybe that day will be in 1987.

I am so proud of our new writers but it would be so much better if our old writers, like you, were back. Can you imagine just how great **CTM** *would be then?* ***WOW! ! !***

I don't remember the two articles you referred to, so just send them to me and I will run them, if it is again then so be it.

Thanks for taking time to write. Chet

AD Gets Results

18 Feb 87

Mr. Lambert:

Thanks for your help ad in **CTM A CTM** reader supplied the needed program requested. I was sent an Atari 800XL ML Language Assembler - EDIT - Disassembler with paper work. Being part of the **CTM Family** really helps!

Howard Bacon
South Pittsburg, Tennessee

Howard you are so right. Being a member of the ***CTM Family*** *is great and not just for the magazine. You feel you belong to a great* *group, and you do. Our subscribers are much more than just subscribers. Teenie and I talk quiet frequently when we get personal calls from subscribers just telling us how much the appreciate the magazine, or how good it was to talk to us at a show, or other subjects too numerous to mention. I am so proud of our* ***CTM Family*** *. I think they are the greatest.*

Needs Help with Packet Equipment

2-18-87

Dear Chet

I have the following equipment: Kenwood TS530S transceiver, Commodore Plus 4 Computer with 1541 Disk Drive and the MFJ 1224 Computer interface. Can these be connected to use in Amateur Radio? If so how?

If your answer to above is negative, I would appreciate knowing of any place where I can obtain this information or where to buy additional material needed to accomplish same.

I have found the **CTM** excellent.

Sincerely Yours,
Anthony Lombardi
Las Marias 869
Rio Pledras, PR 00927

Anthony I believe they can be but what do I know, I only publish the Number One Source of Packet Info. I don't know it all.

I have put your total address here so my readers can get back to you. I really think it can be connected but in your letter you said MFS 1224 and I think you meant MFJ 1224. If so, I really think you can do what you want. But, I am betting many of our readers will come to your aid. Readers don't let me down and get in touch with Anthony and help him out. After all, he is a member of the ***CTM Family.*** *Chet*

Likes Support from Quantum Computing

2/23/87

Dear Frank:

Having not heard from you, I dashed off out of sheer frustration today another letter with a CC to **CTM.** When I arrived home this evening I was pleased to find my order had arrived along with your letter explaining the reasons for the delay: various frustrations with suppliers plus the fierce competion you have.

I am writing this letter with a CC to **CTM** to make sure that we "three" maintain a GOOD relationship.

The MODEM, ModAdapter & Freeware arrived in good condition. Also, the modem appears to be of high quality. Thank you for your efforts & creativity in putting this package together.

I wrote to you out of frustration plus fear of loosing my money as I had heard absolutely nothing from you. In my years of mail order hobbying, I've never had delays like this with out receiving a postcard acknowledging my order and advising of the delays. Also, not being a supplier I have no idea of what your world is like. Thanks for the insight.

In closing, your equipment shipped is excellent quality; thanks for your creativity in putting the package together & I will purchase from you again. Also, I hope the business frustrations get resolved.

Regards,
Mort Binstock
Pittsburgh, PA

Mort, thanks for the copy of the letter to Frank. It is good to know that our advertisers do produce good quality products and I can certainly emphaize with Frank with the frustrations of running a business. At times I think if I didn't have bad luck I wouldn't have any luck at all.

Frank has been in contact with me letting me know some of his problems and I am glad you got your order. Quantum Computing is one of the better companies still dealing with T/S products and I hope you continue supporting him as he supports me. If we all work together, we can survive and if we don't we will start going down the drain one at a time.

Readers I would also be glad to get reports of other dealers of T/S equipment, those who do advertise with us and even those who don't.

Thanks Mort for the copy..... Glad things worked out OK!

Has Converted his C-64's through Bob Hooper Instructions

2-21-87

Chet:

I subscribe to *QST* and *73* also several computer magazines. It has come to my attention you are publishing Bob Hoover's C-64 and 1541 12 Volt modification. You have your "*Head on straight*".

I have modified my two C-64's and two 1541's using a preliminary version of his information and the whole system works **GREAT!** Bob has been very helpful, his clock modules vary less than two seconds in 24 hours, he was gracious to me over the telephone, clarifying a couple of things that were not well spelled out in the preliminary version. The mods are clean and easy, they went surprisingly well. I recommend them to all C-64 owners. I am now capable of using the Packet equipment in any major disaster that could use it. I believe Bob has made a major contribution toward disaster readiness.

Because of your Editing "couth" I am enclosing a check ($33.00) for a two year subscription to **CTM,** sight unseen. I wish you a very successful enterprise and hope I am not disappointed with **CTM.**

C E Bates, W6JWX
West Covina, CA

Mr. Bates: Thanks for the kind words and support of Bob's articles on the C-64 conversion. I sincerely believe he is one of the most dedicated men in providing instructions in ***Emergency Communications*** *and I think the country will gain from his guidance. And, I'm glad* ***CTM*** *is the vehicle to carry his most important message. Our coverage this month in his article* ***California Earthquake*** *is sure to stir the thinking of many, and that is another thing*

CTM is about, causing people to think for themselves and not just follow the crowd or so called leaders.

*I sincerely think you will be pleased with each issue of **CTM**. We have a cadre of great writers of which Bob is just one and you will learn in the first couple of issues just how great their knowledge is. I really believe **CTM** is the best ham magazine on the market plus we cover computers too. A very large number of hams have computers now and more are joining the ranks each day. **CTM** is the only magazine I know of that combines both ham radio and computers and we have done so since we started.*

Thanks for the subscription and the letter. . . Chet

Another Subscriber is happy with CTM and renews

Feb. 25, 1987

Chet:

I am looking forward to seeing you in Indianapolis on May 2, 3, and possible meet Teenie this time.

One of the **CTM Family**
Judy Muir
Forbes Road, PA

Judy thanks for the renewal and I too, hope to see you in Indianapolis. I do believe Teenie will be with me this year. I had fun there last year when a group of us went and ate and Frank Davis and his lovely wife served as host and hostest. They didn't however, pick-up the tab. (I'm only kidding Frank)

Judy this coming event should be so much better than last year and last year was good.

*I hope you continue to feel as a very important member of the **CTM family**, you are in great company. Chet*

Really likes CTM Renews 6 months EARLY! Doesn't want to miss any issues!

Chet:

Enclosed is my check to renew my subscription to **CTM.** This is the first time I have ever renewed a subscription (6) months in advance. I want to be sure I don't miss an issue!

I have been a **Ham** for 30 years and have had a computer for the last 8 years. **CTM** covers both hobbies to my liking, especially packet radio. I con't imagine having a ham station without a computer, or having a computer without ham radio! They certainly complement each other and **CTM** complements them both!

Regardless of what you, "Buck" Rogers, or anyone else say, I think **CTM** means **Chets Terrific Magazine!** Keep up the good work!

Jim Fodor, W4MOY
Warner Robbins, GA

*Jim, thanks for such a great testimonial and for being such a faithful **CTM family member.** It is subscribers like you, who will make **CTM** a winner regardless of the problems we have. I do so appreciate your comments, who knows, perhaps you will stir the immagination of others who feel such as you but didn't realize it. If others would renew without me having to take time out each month to stamp their label or the post card I send out as a last resort, I could have more time to clean up our act.*

*We do have our problems and I would like so much to have **CTM** out on schedule each month but I just have to slow up some. I am not as young as I use to be. None of us are.*

Again, my sincere thanks for your support and trust. God Bless. . . Chet

Likes CTM But. . .

2-27-87

Dear Chet:

I am a new subscriber with three issues so far and enjoyed everyone. BUT! I find you are short on TI-99/4A computer articles. Perhaps you can get Don Hartley to send in some more. After reading his blast in Dec '86 issue I went and dusted off a TI-99/4A and am ready to add it for PACKET.

Like to see something on hooking up packet to the output port of the TI.

A simple program to use for TI-Packet.

Above all, a simple word processor program to use with the TI. Anything on the new Miniwriter cartridge III, the one that has a cable sticking out of it that goes to a printer?

A good interface to use between the TI port and any printer?

List of sources of TI hard and software.

Hope you can add all or part of the above in future issues.

Keep up the good work
Wilbur T. Golson
Baton Rouge, LA

W.T. thanks for the letter and I hope and wish I could fulfill your expections as Santa Claus does but I just don't have that power. I am at the mercy of our writers. I wish I had a larger group of writers on the TI but I don't. I do hope Don will pick-up on your request and I am betting you are just one of many who wishes the same wishes.

Don is doing a fine job writing about the TI but I could use more from him or more writers to satisfy the desires of people like you. Perhaps if you and others would write to Don in person. I have told my readers for years to let the writers know how you are receiving and feel about their articles. I know some writers who are nearly flooded with mail while others are starving. It is a shame that I have lost the quality and number of writers over the years. And, it is my opinion most if not all of them quit writing becaues they weren't getting letters. One way or another on what they were working very hard to provide.

It is my wish that not only you but all of our readers would get a stack of post cards and let the writers, you like, know it! It is very important!

Needs C+4 Ham Programs

March 5, 1987

Dear Chet:

I thought you would like to know that I became aware of your excellent magazine through the sample copies you sent. There may be others from our ham club who will be subscribing.

Chet, do you know of a source of Ham programs for the Commodore Plus 4? Where is a good source of information on interfacing the Plus 4 to RTTY and Packet equipment?

Thanks for your good magazine.

Del Nack, KA9TDT
Newton, IL

Del it is my hope and belief several of my writers and readers will respond to your request. I do have some coverage of the C+4 in the magazine most each month. At least when Tom has time to write. I bet he will get in touch with you through the letters column because I think there are many more of the C+4 owners out there with the same desires.

I do hope you get your answers. I am not putting your address here because I want the answers to go through these pages so more people with get the information.

I am also betting you will like each issue better and better and you will fast become addicted to **CTM** *as thousands over the country have. Tell your friends about us and make them better friends. I get comments from people all the time "I haven't heard of* **CTM** *or I didn't know you existed" We are getting closer to our 6th anniversary and have shown a great growth over the years but not as big as I had hopped. Perhaps, through your influence, we can grow larger. Try it, you will be happy to make people happy. . . I am. Thanks for writing Del and God Bless.*

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Coming Events

Each month we publish names, dates and other information for Computer Expos and Hamfest and other events we feel you may want to know about. We will not be held liable for mistakes i.e., wrong dates or other information as given to us. Our sole liability is to reprint the correct information.

1987 1987 1987 1987

MARCH

7-Mammouth Cave Amateur Radio Club - GLASGOW SWAPFEST: "WE HAVE MOVED" This year we will be held at the Cave City Convention Center, in Cave City, KY. The location is near I-65. The Swapfest will start at 8:00am CST and will end when all goes home! Admission is $3.00 per person and **no charge for exhibitors.** Extra tables available at $3.00 ea. FCC VE test will begin at 10:00am Walk-ins only and be sure to bring your *original license and photocopy.* Talk-in on 146.34/94 and 144.59/145.19. For additional information please contact Mike Goad, N4HCO, Rt #9, Box 112B, Glasgow, KY 42141

8-WECAFEST '87 HAMFEST - Westchester Emergency Communications Associations's third annual hamfest and electronics fair at Westchester Community College, Valhalla, NY. Additional info from Sal Lagonia, N2EQM WECA P.O. Box 131, N. Tarrytown, NY 10591. Dealer inquiries should be addressed to WECAFEST '87, P.O. Box 348, Millwood, NY 10546. Talk-in on 147.66/.06; 22.80/224.40; 442.475 /447.475 Mhz.

12-14 Personal Computer Interfacing for Scientific Instrument Automation Workshop: To be held at Blacksburg, VA. These are hands-on workshops with each participant wiring and testing interfaces on the IBM-PC and other personal computers. For additional info contact: Dr. Linda Leffel, C.E.C., Virginia Tech, Blacksburg, VA 24061 (703) 961-4848

***21-22 Charlotte Hamfest & Computerfair -** The Mecklenburg ARS, will hold its annual hamfest at the Convention Center downtown Charlotte, NC. Hours: 9am to 5pm Saturday and 9am to 3pm Sunday. Admission $5. in advance with SASE untile March 14; $6. at the door. Mail preregistration to Jack Arnold, KD4JC, 1333 Picadilly Dr. Charlotte, NC 28211. Forums both days. Over 150 dealer-manufacure booths. Preregistration for VEC exam to be held on Saturday. Send completed Form 610, photocopy of present license, $4. fee to Charlotte VEC, 227 Bennett Lane, Charlotte, NC 28213. Talk-in frequency will be on 145.29 down 600.

21-22 North Florida Ham Swapfest - Fort Walton Beach, Florida. To be held at the Fairgrounds. Huge indoor flea market, tables $10 day $15 weekend. FCCL VEC license exams $4.35. Send check to Bill Hord, W4WIJ, 618 Pelican Dr., Ft. Walton Beach, FL 32548 (904) 243-9720. *Original current license, photocopy and picture ID required* Free parking, RV parking available on site first come/first served for electric hookup $5.00 per day with electric hookup. For Dealer information Hal Byrd, WG4X (904) 243-0882. For additional information contact PARC Ham/Swapfest, Box 873, Fort Walton Beach, FL 32549.

21-26th Michigan Crossroads Hamfest-Marshall High School, Marshall, MI. Take I-69 to I-94 then East to exit 110 or I-94 (Old US-27) Then South and East to school. Follow the signs. For additional info contact. SMARS, PO Box 934, Battle Creek, MI 49016 or call Wes Chaney N8BDM (616) 979-3433. Talk-in on 146.67 or 146.52 or 223.94

22-Lake County Hamfest-The 9th annual hamfest will be held at the Madison High School, Madison, Ohio. FCC Exams will be given for $4.35 make check to ARRL/VEC by March 15. For additional details please contact Lake County Hamfest Committe, 7803 Skylineview Dr., Mentor, OH 44060 Talk-in 147.81/21

28-29 Elizebeth Hamfest For additional information contact M.D. Hilltown, KA4BYA, RR2, Box 204, Cecilie, KY 42724

28-29 Greater Baltimore Hamboree & Computerfest - To be held at the Maryland State Fairgrounds in Timonium, Mary-land. For additional information please contact Baltimore ARC, P.o. Box 95, Timonium, MD 21093

***28-29 Columbus Hamfest** Columbus, Georgia hamfest will be held at the Columbus Municipal Auditorium US 280 Victory Drive at South end of 4th Ave Highway 27. Free admission and free parking. ARES and MARS For-ums. FCC Exams on Saturday 9am at Colonial Inn. For additional information please contact CARC, Box 6336, Columbus GA 31907 or call (404) 687-3050

APRIL

25-Inland Empire Amateur Hamfest-Located at the Red Cross Bingo Hall, West 708 Boone, Spokane, WA. For additional information please contact: Robert Spencer, KE8DM, IEAH, West 3022 Francis, Spokane, WA 99205-7259

MAY

***2 - 3 - Second Annual Midwest Timex/Sinclair Computer Fest** Will be held this year at the Holiday Inn-North, Indianapolis, IN. This year we have 6,000 sq ft of floor space available. For additional information please contact. The Midwest Timex/ Sinclair Computer Fest, Frank Davis, 513 East Main Street, Peru, IN 46970 or call our BBS at (317) 473-8031. **(NOTE: IF YOU MISSED LAST YEAR AND YOU ARE A TIMEX/ SINCLAIR USER, YOU NEED TO BE THERE! IT IS WELL WORTH THE TRIP, I AM PLANNING ON BEING THERE AGAIN THIS YEAR! Chet)**

2 - 3 Baton Rouge ARC "Hamfest 50" - Louisiana State Convention to be located in the Gym Armory on the campus of Louisiana State University in Baton Rouge. Sat 8am - 3pm; Sun 8am - 2pm. Free Admissionm, Forums, ARRL speakers, advanced reservations for swap tables accepted, new equipment dealers, ladies activities and tour and $6000. in prizes. VE Exams to EXTRA both days 9am. Send SASE, 610, check for $4.00 payable to ARRL/VEC to George Perry W5LVX, 17424 Lady Constance, Greenwell Springs, LA 70739. Talk-in 146.19/79. More info SASE Rick Pourciau, NV5A, 879 Castle Kirk Dr., Baton Rouge, LA 70808. There will be Cajun food and entertainment Saturday nite.

***16 - 17 - BirmingHAMfest -** Birmingham, Alabama. New Location this year. Site for this years BirmingHAMfest is Boutwell Auditorium near the Civic Center. For additional information contact Dan Morgan, KB4MDI 632 Stonehaven Drive, Birmingham, AL 35226 (205) 822-5242. For Commercial Exhibitors contact: Mike Murray, WD4IXE, 917 6th St SW, Birmingham, AL 35211 (205) 780-6275 Hph & (205) 252-2800 Wph. For Flea Market Contact: James Pilman, KA4ZQA, 5385 Wayhigh Lane, Birmingham, AL 35243 (205) 991-7762 Hph & (205) 780-6275. Exhibitors who will be present and those who won't be able to attend but want to be included in our professional program please contact Chet at **CTM.** Talk-in frequency 146.88, 146.76 plus many many more repeaters. **THE BirmingHAMfest is on the GROW!**

16-17 Rochester Hamfest Located at the Monroe County Fairgrounds, Rt 15A, Rochester, NY. Show hours 830am to 530pm Saturday & 900am to 130pm Sunday. For additional information please contact: Rochester ARA, Rochester Hamfest, 300 White Spruce Blvd., Rochester, NY 14623 (716) 424-7184

***23-24 Knoxville Hamfest** - will be held same as last year at the Kerbela Shrine Temple, Knoxville, TN. For additional information please contact: gene Scarboro, WB4VWO 1646 E. Union Valley Road, Seymour, TN 37865 or Radio ARC of Knoxville, P.O. Box 124, Knoxville, TN 37901

28 - 30 Personal Computer Interfacing for Scientific Instrument Automation: These are hands-on workshops with each participant wiring and testing interfaces on the IBM-PC and other personal computers. for more information please contact: Dr. Linda Leffel, C.E.C., Virginia Tech, Blacksburg, VA 24061 (703) 961-4848

JUNE

6 - 7 Apple City Radio Club Hamfest - will be held at Rocky Reach Dam, 7 miles north of Wenatchee, Washington on U.S. Highway 97. There will be ARRL/VEC exams gives. Free camp/RV space available at the park. For additonal information please contact Merton, Hiatt Apple City Radio Club 1002 No Surry Rd., Wenstchee, WA 98801.

7 - 33rd Annual Breeze Shooters Hamfest - Will be held from 900am to 400pm at the White Swan Amusement Park, PA Rt #60 (Parkway West), near the Greater Pittsburgh International Airport. Free admission and flea market, family amusement park. Talk-in on 29.000MHz, 146.52. Direction on 146.28/88 MHz. For information please contact Bud Faulhaber, N3DOS, 1059 Balmoral Dr. Pittsburgh, PA (412) 366-5097

*** 5 - 7 Ham-Com 1987** - to be held at the Arlington Convention Center, Arlington, TX between Dallas and Fort Worth. For additional information please contact: John J. Fleet II, Convention Chairman, Ham-Com Box 25028, Dallas, TX 75225 (214) 521-9430

14 - The Monroe County Radio Communications Association Swap and Shop will be held Sunday at Monroe, Michigan. It will be held from 8am to 3pm. Advanced sale tickets: $2.50 - $3.00 at gate. Trunk sales $2.00 per space. Table space 50 cents per foot. For tickets or space reservations contact: Elaine Wessel, KA8RNK, PO Box 237, Monroe, MI 48161, (313) 279-1571

13 - 14 Albany Hamfest, Motor Inn & Convention Center, Contact: Albany Amateur Radio Club, PO Box 1205, Albany, GA 31702

20 - Grand Mesa Repeater Society - will hold the 8th annual Western Slope Amateur Radio and Computer Swapfest on Saturday June 20, from 9am to 4pm at the National Guard Armory. 482-28 Rd., Grand Junction, Colorado. Admission is free and wap tables are $5. each. Featurers will include an indoor swapfest. ARRL?VEC exams, an auction. Talk in on 146.22/82 and 449.20. For additional information contact Les Scott, NC0F, 2105 Yellowstone Rd., Grand Junction, CO 81503 or call (303) 242-5296

20-21 AMACOM New Orleans Hamfest - will be held at the Rummel High School, Metairie, LA. There will be flea market, exhibitors and a dinner Saturday night. ARRL/VEC exams will be given. Additonal information contact Bill Bushnell, P.O. 73665 Metairie, LA 70033 or call at (504) 887-5022

JULY

5-9Second International Congress on Early Childhood Education-at the Childhood in the Technological Era, Tel Aviv, Israel. For additional infor contact: International Ltd. P. O. Box 29313, 61292 Tel Aviv, Israel or call (03) 65441 Telex: 33-554, In USA contact TZELL Travel, 70 West 36th St. New York, NY 10001 (212) 279-3700

***10-12 ARRL NATIONAL CONVENTION ATLANTA, GEORGIA-**The 1987 National ARRL Convention will be held at the Georgia World Congress Center, Hall F (114.500 sq ft) full Air conditioned. For additional information please contact Roy Epps (404) 457-2916

11-Straits Area Amateur Radio Club Swap & Shop-will be held at the Fair Grounds Petoskey, Michigan. Free RV parking Friday night for self-contained RV's. For additonal information please call (616) 347-8693 or 582-7322

26-Maryland Hamfest and Computer Fest - will be held at the Howard County Fairgrounds, 15 miles West of Baltimore just off I-70 ar Rt. 32 on Rt 144. For complete information please contact BRATS, PO Box 5915, Baltimore, MD 21208. Talk-in on 146.16/76, 147.63/03, 146.52

AUGUST

***1-2-14th Greater Jacksonville Hamfest-** The Jacksonville, Florida hamfest will be held in a new location this year at the **Prime F. Osborne Convention Center.** Will will have room for over 700 swap tables and 50 exhibitors. The new center is fully air conditioned. 850 parking spaces available and esy access of I-95. For additional information please contact Barry Baines, WD4ASW, Greater Jacksonville Hamfest Association, P.O. Box 10623, Jacksonville, FL 32207 or call (904) 350-9193

SEPTEMBER

19-20 Superfest '87-will be held at the Exposition Gardens, W. Northmoor Road, Peoria, IL off 6300 Block N. University. Latest information from Superfst '87, P.O. Box 3461, Peoria, IL 61614 (SASE) please.

OCTOBER

9-10 ARRL Southwestern Division Convention - to be held at the Safari Hotel & Convention Center, Scottsdale, Arizona. Guided tour of Barry Goldwaters, K7UGA shack, full round of activities for all attendees. For full details please contact C. W. Mulkin, W7KB, 6150 E. Harvard St., Scottsdale, AZ 85257 (602) 947-0296

***24-25 Hamfest Chattanooga 1987 -** to be held at the Hamilton County Convention and Trade Center, Chattanooga, Tennessee. For additional information please contact Nita Morgan, N4DON Hamfest Chattanooga, P.O. Box 3377, Chattanooga, TN 37404

NOVEMBER

20-22-FLORIDA GULF COAST ARC HAMFEST-will be held at the newly completely renovated Hilton Hotel. Full round of activities for attendees. Saturady from 9am to 5pm, Sunday from 9am to 3pm. Additional information may be had from Ms. Jean Endicott, 1556 56th Ave. North, St. Petersburg, FL 33703 (813) 525-5178

* denotes those shows **CTM Magazine** will attend as an exhibitor. SEE YOU ALL THERE! ATTENTION Show Producers!! Send me your 1986 Show schedule and I'll include it in our "Coming Events" section, free of charge.

Operating Events

May

9-Nevada QSO Party 1987 Sponsored by: Frontier Amateur Radio Society at 0000Z May 9, 1987, Use CALL: CQ Nevada QSO Party or CQ Nevada, Frequencies 160 meters thru 6 meters for additional information please contact. Frontier Amateur Radio Society, 1813 Sillver Lane, Las Vegas, NV 89104

July

11-12 Oklahoma amateur radio operators will conduct their fourth annula "Field Day" exercises Saturday & Sunday at Lake Canton, OK. Activities begin at 2pm Saturday and continue until noon Sunday. Events will take place in the "Big Bend" picnic shelter. To highlight this special event, the Lake Canton Field Committee will provide a commemorative certificate for contacts with event stations WD5HPU, WA5LTM and other amateur stations which officially operate from Lake Canton during the event. Those desiring commemorative certificates should listen in the general phone portions of the 40 - 10 meter bands. Operations will also be conducted on 6 and 2 meter SSB. Operation will be in "Grid Square" EM-06. For a certificate, send QSL and Large SASE to Lake Canton Field Day, P.O. Box 19097, Oklahoma City, OK 73144.

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Radio Shack CoCo, 16K Extended Basic software, 1 cassette cable additional software includes: Atlantis Adventure game - Hamshack which includes Graphic programs, Telewriter, Color term, RTTY, CW Rx/Tx, plus & I also have some books. Will trade all for a good police scanner or Short wave receiver or any other ham or computer equipment. Jamie Lucus, Rt 15, Box 884, Birmingham, AL 35224 (205) 786-0010 (2-2)

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WANTED COMPUTER EQUIPMENT

Wanted: I need a **Drive 0 for a CoCo.** Everett Thompson, Rt 1, Box 61, Lagrange, ME 04453 (207) 943-2102 (1p)

Instructions on how to build a RS232 interface for adapting a printer to Timex 2068. Also need programs to enter. W. E. Powden, Rt #1, Box 364, Bridgeport, Il 62417 (2-2)

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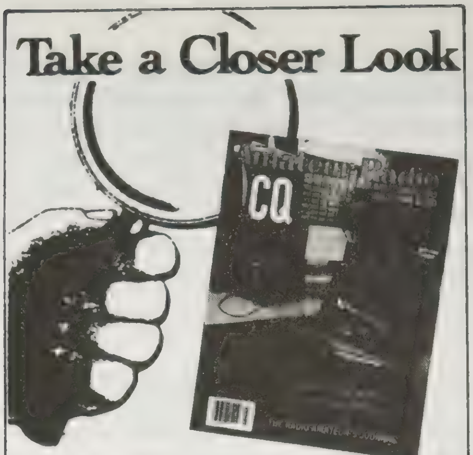

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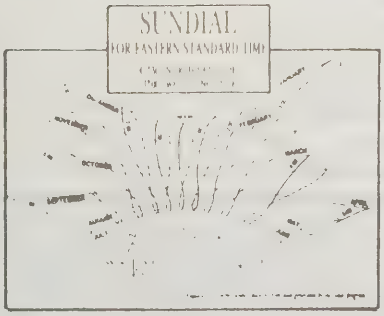

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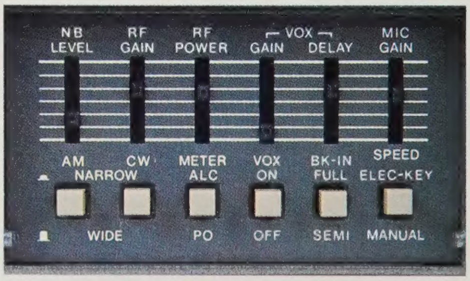

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